AD-A146 548 SIGMA CODE TESTING(U) SCIENCE APPLICATIONS INC MCLEAN VA J L SEFTOR ET AL. 28 MAR 84 SAI-84/1073 N00014-83-C-0289 1/2

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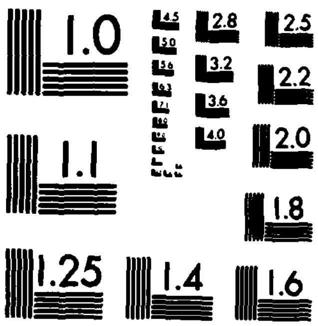

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Sigma Code Testing

SAI Final Report No. SAI-84/1073

March 28, 1984

J. Laurence Seftor
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SCIENCE APPLICATIONS, INC.

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Sigma Code Testing

SAI Final Report No. SAI-84/1073

March 28, 1984

Submitted to:

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Contract No. N00014-83-C-0289

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SAI-84/1073	2. GOVT ACCESSION NO. AD-A146548	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Sigma Code Testing		5. TYPE OF REPORT & PERIOD COVERED Final 3/83-3/84
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) J. Laurence Seftor and Glyn O. Roberts		8. CONTRACT OR GRANT NUMBER(s) N00014-83-C-0289
9. PERFORMING ORGANIZATION NAME AND ADDRESS Science Applications, Inc. 1710 Goodridge Drive, P.O. Box 1303 McLean, Virginia 22102		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research 800 N. Quincy Street Arlington, VA 22217		12. REPORT DATE 28 March 1984
		13. NUMBER OF PAGES 163
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Naval Ocean Research and Development Activity Code 322, NSTL Station, MS 39529 Attn: Dr. S.A. Piacsek		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Distribution Unlimited

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Numerical Ocean Forcasting
Ocean Circulation Modeling
Open Boundary Conditions

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The SAI/NORDA Sigma Coordinate Ocean Forcasting computer code is a complicated simulation tool for modelling the behavior of the world's oceans. In this report, we present the result of a set of tasks which increase the code's accuracy and usefulness as a simulation tool. These tasks include the implementation of open boundary conditions, the creation of initialization data from mixed data sets, the improvement of output options, and

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S/N 0102-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

the installation of the code on the VAX supermini computer. We also present the results of preliminary set up tasks for a simulation of the semiclosed basin of the eastern Mediterranean.

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1.0 Introduction

The SAI/NORDA sigma coordinate ocean forecasting computer code (sigma code) is a complex tool for predicting ocean temperature, salinity, density, sound speed, and the three components of current velocity as functions of location and depth. The non-uniform sigma vertical representation is used to simplify the treatment of the severe topography encountered in the ocean and to concentrate computation levels near the surface. A stable, temporally implicit finite-difference representation of the model differential equations allows the use of large time steps.

The basic code has been developed under past contracts (see references). The testing of the model, however, has been limited by the simple no-flux lateral boundary conditions installed in the model during its development.

This report will discuss the development and partial implementation of open boundary conditions into the model.

Also presented are the results of a series of smaller tasks which have been undertaken to increase the code's usefulness. They include new mechanisms for data initialization, new output options, and the conversion of the code to the VAX super minicomputer.

Finally, initial results will be presented for a study of ocean behavior in the semi-closed basin of the Eastern Mediterranean.

2.0 Open Boundary Conditions

The original form of the code used a very simple lateral boundary condition; no flux was allowed. This rigid wall approximation, while useful for testing, is not valid for any ocean region of interest. All ocean areas have significant inflow and outflow.

Two approaches were taken for providing open boundaries. The first is a simple condition, which can be of use in regions where the flow in and out is of limited spatial extent. Two examples are the Gulf of Mexico and the Mediterranean. This scheme will be discussed in section 2.1.

A more realistic approach requires full information about temperature, salinity, and velocities at each point of the simulation region boundary. To provide such information, a nested run approach was undertaken. In this scheme, a coarse run is performed over a large region. This run stores initial and boundary data, which is used by a second run whose simulation region is nested within the region of the large run. Because of the very complicated spatial representation used within the Sigma Code, this second approach requires very complex coding. The partial implementation of this second approach will be described in section 2.

2.1 Flux Specified Boundaries

In this approach, a single flux is specified for each of the four edges, of the system. A function of lateral area is used to determine how much of the total flux will be deposited at each spatial location. For example, if the west edge of a simulation region is all land, except for a narrow strait, virtually all the flux will occur at the strait. This follows from the fact that the strait contains all the lateral area for that edge of the system (see figure 1). It should be remembered that in the sigma code there are a full set of computational levels, even over land areas. This scheme ensures that over such land areas, no flux will be allocated.

The flux at each lateral point is given by

$$u_n = A*f(t)*U(\bar{z}^k,\ z_b,\ \mathrm{DINFL},\ \mathrm{DINFLS})$$

where A is determined below, f(t)=1 -exp(-ISTP/30) with ISTP the time step number, and U is the functional dependence of the vertical profile. We define

$$U = \frac{V*W}{|V|+W} , \qquad \text{where}$$

$$W = \frac{Z_b - Z}{\mathrm{DBOTBL}} \qquad \text{and}$$

$$V = \frac{\mathrm{DINFLS}-Z}{(\mathrm{DINFLS}+Z)\ (1+ Z/\mathrm{DINFL})} .$$

DINFL, DBOTBL, and DINFLS are given as input parameters, z is the depth, and z_b is the bottom depth. DBOTBL, through W, controls a function which linearly drops from z_b/DBOTBL at the surface, to 0 at the bottom.

The function V determines the actual shape of the vertical profile. DINFL sets the approximate depth of the inflow. Since it is sometimes desirable to have both inflow and outflow occuring at the same location, V changes sign at depth DINFLS. By setting DINFLS very large (1.E10), no sign change occurs, and V is always positive. When DINFLS is 0., the sign change occurs at the surface, and V is always negative.

The constant A is adjusted according to

$$\text{FLUXIN} = -A\Sigma U\alpha_n \quad ,$$

so that the total flux at each edge totals up to the input parameter FLUXIN. U is as defined above, α_n is a geometry factor which depends on the edge being specified, and the sum runs over all points on the edge.

There are two modes of operation for this boundary condition. The first is unidirectional flow. The user sets DINFLS large (>1.E10), and sets DBOTBL, DINFL, and FLUXIN for the desired flow.

The second mode is bidirectional flow. In this case, the user can set the ratio of inflow to outflow, DINFLR. The code, by an iterative scheme, adjusts one of the

other variables to obtain the correct ratio. If DINFLR>Ø, DINFLS is adjusted. DINFLR<Ø is a way to adjust DINFL instead. For best results, a good guess for DINFL and DINFLS should be made. By running the code with NSTEP=Ø, the final value of DINFLR can be compared to that requested.

The input variables are:

FLUXIN(i)	total flux (outward) for this edge,
DBOTBL(i)	scaling factor for linear profile,
DINFL(i)	depth of inflow,
DINFLS(i)	depth of sign change, and
DINFLR(i)	ratio of inflow to outflow.

Here i determines which edge of the system according to

i=1	west edge
2	east edge
3	south edge
4	north edge

The adjustment of DINFL or DINFLS, and the determination of A is performed in new subroutine FLUXST. The flux calculated by this scheme is added to the velocity arrays in UVBND.

2.2 Open Boundary Conditions Based on a Nested Run

A nested run consists of a fine resolution run whose simulation region is located within the simulation region of a coarse, larger area run. (See Figure 2). There are four aspects of such a simulation. One, a coarse simulation is performed. This run writes out both data for initialization of the fine run, plus boundary data on the embedded boundaries. Second the fine run performs a complex interpolation from this data to obtain an initial condition. Third, the fine run performs a complex interpolation, at each time step, to find appropriate values along its boundary. Fourth, these boundary values are used in a suitable boundary condition. Each of these steps will be described below.

2.2.1 Coarse Run

The initialization data written out by the coarse run consists of temperature, salinity, pressure and velocities over a region which encompasses the fine region. All the coarse data is not needed, and it is not written out. There may, however, be more than one fine region nested within a particular coarse region. The data for each fine region is written to a different file.

The number of such subregions is specified by input parameter NREGON. For each of these NREGON subregions, the location of the boundaries is specified by:

SAVLLO(i) west edge of region i in degrees
SAVLHI(i) east edge of region i in degrees
SAVPLO(i) south edge of region i in degrees
SAVPHI(i) north edge of region i in degrees.

The coarse run uses these input variables in subroutine REGNST to establish the areas on its grid that will have to be written out for each of the subregions. It also determines the locations of its grid lines which lie on either side of the embedded boundaries, for both T-S and U-V data, again for each subregion.

At each time step, subroutine SAVREG is called to write out the appropriate data. The writing of data is controlled by:

SAVSTR(i) time step of initial write for region i.
SAVINC(i) modulus on time step to perform write for region i.

On only the initial write, data for initialization is written out. On this, and all subsequent writes, boundary data is written. Each subregion has its own file. Therefore, the location and frequency of the data may be completely different for each subregion. The file unit number is 70 + i, where i is the region number.

Subroutine RWBND is used to read or write the boundary data.

2.2.2 Initialization of Final Run

The data written out by the coarse run must be interpolated onto the fine mesh of the nested run. This is complicated by the complex spatial representation of

the sigma code. As can be seen in Figure 2, the lateral mesh spacing may be nonuniform and arbitrary. As shown in Figure 3, the vertical spacing is nonuniform and depends both on the topography, and the number of vertical levels. In a typical simulation, no two grid nodes are located at the same depth.

The initialization in the sigma code is performed by one of the "CASE" routines. For the nested run the input parameter CASE is set to 8. This causes subroutine CASE8 to be called to perform an initialization from coarse run data. Storage must be carefully handled so that no excess array space is allocated. To do this, CASE8 was designed as a dummy routine to handle storage for subroutine CASE8A where the actual interpolation is performed.

In CASE8A an interpolation is performed using the 8 surrounding data points from the coarse data. Weight factors are determined, and then the new value is calculated from,

$$X_f = \frac{\sum_{i=1}^{8} \omega_{(i)} X_c(i)}{\sum_{i=1}^{8} \omega_{(i)}} .$$

Because of the representation, the eight weights have different values for each of the fine mesh grid points.

Additional problems arise because of the use of real topography. In Figure 3, point A is a possible location of a fine mesh point. It can use the coarse value to the

left, but the coarse value to the right does not lie deep enough for point A, and it cannot be used. The interpolation scheme is therefore modified to exclude the point to the right, and the weights for the points actually used are corrected.

Point B is the location of a second type of problem. At this location no coarse data is available at the depth of point B. For this problem a different procedure is used. Subroutine CASE8B is called to perform a spline extrapolation of the surrounding data to obtain values at the correct depth. Then a four point lateral interpolation of these extrapolated values is used to obtain a reasonable result. This involved procedure is only used for temperature and salinity values. For a velocity point at location B, when no coarse data are available, the velocity is set to zero. This ensures that no artifical flows will result.

It should be noted that different weights are required for temperature-salinity (T-S) and velocity data, since T-S data locations are spatial shifted from velocity locations.

2.2.3 Determination of Boundary Value Data for Fine Run

At each step during the fine run, the values of temperature, salinity, the velocity, and the pressure must be determined at the location of the physical boundaries of the smaller system. These values are calculated, and

put into a set of two-dimensional arrays. These arrays are used by the boundary conditions in determining the values of the relevant quantities at the guard cells. It should be noted that these boundary values are not used directly, but are used in the application of the boundary conditions.

Data is written out on both sides of the boundary by the coarse run. Since T-S and U-V data are spatial displaced, these surrounding boundary planes are located differently for the two types of data.

Subroutine EXBND is used to determine the values of data on the boundaries. As in the use of CASE8, EXBND acts as a storage manager for EXBNDA, where the actual interpolation is performed. The interpolation scheme is the same as that used in CASE8A, with subroutine CASE8B used here alsc for points out of range.

2.2.4 Implementation of Nested Boundary Conditions

Our planned implementation of nested boundary conditions is based on a major extension of the analysis in § 4.4 of the prior study (Roberts, 1982). In that section we studied the reflection and transmission properties of different sets of open boundary conditions applied to the one-dimensional wave equation, and demonstrated that the spurious waves could be reduced to

a minimum by imposing

$$cu_n + p$$

on the boundary, where p is the scaled pressure, u_n is the outward flow, and c is the local phase speed of the wave. The success of this method follows from the fact that the outward and inward propagating wave modes have

$$cu_n = \pm p,$$

respectively.

In the prior report we reached the conclusion that a generalization of this boundary condition to the three-dimensional sigma code, with rotation, diffusion, stratification, and bottom topography effects, in addition to the surface gravity waves, was impractical. In § 5 we outlined a simpler set of boundary conditions based on the normal flow and on conservation requirements.

However, we now believe that for most situations of interest, spurious surface and internal gravity waves generated at the open boundaries by poorly chosen boundary conditions will pose the greatest problem in nested computations. We therefore plan to implement a generalization of the above boundary condition to the full three-dimensional sigma-coordinate system of equations.

Our boundary conditions are

$$\bar{u}_n^n = u_{nd} + F(\bar{\pi}^{\|} - \pi_d) + \beta g(z, z_b)$$

$$\delta_n u_{\|} + \alpha(\bar{u}_{\|}^n - u_{\| d}) = 0$$

$$\delta_n \bar{T}^n + \alpha(\bar{T}^{nn} - T_d) = 0$$

$$\delta_n \bar{S}^n + (\bar{S}^{nn} - S_d) = 0$$

Here

u_n and $u_{\|}$ denote the velocity components outward and parallel to the boundary,

$\bar{f}^n$ and $\bar{f}^{\|}$ denote averages of adjacent mesh values in the same directions, for any variable f,

f_d denotes data values obtained by interpolation from the previous coarse run, at the appropriate positions and times,

α is a positive function of $u_n \delta x/K_H$, and is zero for large values (passive outflow condition) and very large for negative values (value imposed on inflow),

$\delta_n \bar{T}^n$ is the difference over two mesh intervals (outside minus inside) divided by two,

$\bar{T}^{nn}$ is the mean of the outside and inside values, ignoring the boundary value (a non-standard notation),

g is $(z-z_b)/(1+z/z_i)$

β is zero or is chosen so that the total normal is an imposed value obtained from data on the movement of the free surface.

F is an operator designed to separate the internal wave modes, and divide each by an appropriate wave speed c; the

simplest operator option is to divide by a single imposed c value.

These boundary conditions replace our previous conditions

$$\bar{u}_n^n = U$$

$$\delta_n u_{\parallel} = 0$$

$$\delta_n \bar{T}^n = 0$$

$$\delta_n \bar{S}^n = 0 \quad .$$

For our Mediterranean simulation we imposed a nonzero U distribution; U has otherwise been zero.

2.2.5 Status of Implementations

The first three steps have been implemented, and preliminary tests performed. Coarse runs have been used to write out initial and boundary data. Fine runs have read in initial data, and have interpolated this data to get an initial condition for the system. In addition, the boundary data has been interpolated to obtain values of the relevant quantities on the boundaries.

There has been insufficient time, however, to implement the algorithms of Section 2.2.4. These algorithms will go into subroutines TSBND and UVBND, and will use the boundary value data which now exists in the code.

Subroutines which have been changed and new subroutines are listed in Appendix A.

3.8 External Data for Initialization

The quality of a simulation is very dependent on the quality of the data used for the initialization of the run. It is, therefore, very important to use the best quality data available for initialization. OTS and EOTS data is of better quality than climatology, but such data does not go deep enough to initialize the entire simulation region. The best solution, therefore, is to smoothly merge two data sets to provide OTS or EOTS where available, and climatology where not. The transition between the two data sets must be smooth, or numerical noise will result.

If T_E is OTS or EOTS data, and T_C is climatology data, the procedure is as follows. For depths above the lowest T_E point (z=d)

$$T = T_E(z), \qquad (z \leq d)$$

where T_E at arbitray values of z are determined from a spline fit. For z>d,

$$T = T_C(z) + \Delta T f(z) + \Delta T' g(z) \, .$$

Here $T_C(z)$ is again obtained from a spline fit, and

$$\Delta T = T_E - T_C \qquad \text{at} \qquad z = d$$

$$\Delta T' = T'_E - T'_C \qquad \text{at} \qquad z = d \quad .$$

The functional forms of f and g are given as

$$f(z) = \frac{z}{d} \exp\left(1-\frac{z}{d}\right),$$

$$g(z) = (z-d) \exp\left(1-\frac{z}{d}\right).$$

At z = d these functions result in

$$f(d)=1 \quad , \qquad f'(d)=0,$$

$$g(d)=0 \quad , \qquad g'(d)=1.$$

The implementation of this capability involved two sets of changes. First the data tape handling program TAPER2 had to be slightly modified to create a data file with both OTS (or EOTS) and climatology. Secondly, two new CASE routines, CASE6 and CASE7 were written to read in the combined data, and to perform the merging. CASE6 merges OTS and climatology, while CASE7 handles EOTS and climatology.

In practice, two TAPER runs are used to produce the combined input data set. The listing in Appendix B is an example which shows the procedure. A TAPER2 run is used to read in the appropriate OTS (or EOTS) data. Then a TAPER3 run is used for the climatology data. The output of TAPER3 is appended onto the output file from TAPER2 to form the required input data file.

In the sigma code run, one simply assigns the data file produced by the TAPER runs. Then the CASE input parameter is set to 6 for OTS, or 7 for EOTS, and the proper initialization is performed.

4.8 Enhanced Output Options

The sigma code has an extensive set of output options. Graphics output can be produced of all relevant data fields, on either plotting devices, or as printer plots. Several desired enhancements in the existing sigma code output were identified, however, and they are the subject of the current section.

The geostrophic velocity is the velocity that results from the balance between the horizontal pressure gradient and the horizontal component of the coriolis acceleration. It provides useful information about the state of the physical system being simulated. Therefore, plots of the geostrophic velocity were added as an output option.

The geostrophic velocity is calculated during the vertical sweep through the mesh by UVDOTB. Rather than allocate an additional three dimension array to hold this information, each two dimensional slice is written to a disk file by UVDOTB as calculated. At the end of the sweep, new subroutine UVGEO reads this information into a three dimensional scratch array, from which it is written onto the plot file.

Subroutine OCPLOT, in the plotting package, was modified to create plots from this newly available data. A typical output plot is shown in Figure 4.

In addition to this new capability, three

enhancements were made to the existing code. First, on restarts, because of the way time step numbering was handled, plot specification did not work properly. This was corrected by a complete revision of time step handling on restarts.

Second, the orientation of the plots of vertical profiles was awkward, and did not follow the conventional orientation for such plots. This has now been corrected.

Third, up to now, certain quantities were only available as printer plots. Now such information can be displayed on plotting devices. Sample plots of the barotropic stream function are shown in Figure 5 and 6.

The required changes to the sigma code are included in Appendix A. Those subroutines in the plotting program which required change are listed in Appendix C.

The capability to plot velocities at a constant depth is available by modification of the TSPOP post processor. In the main program, the lateral averaging of the bottom topography is removed. In addition the calls to MESHST are changed so that the U-V positions, rather than the T-S positions are produced. The resulting code is given in Appendix D.

5.0 VAX Version of Code

The usefulness of the sigma code increases when it becomes available on additional computer systems. Because of the wide spread availability of the VAX 11/780 super minicomputer, it was decided to install the sigma code on this machine.

The code has been installed on the VAX and a sample output plot from a simple test run in shown in Figure 7. The code runs much in the same way as it does on the TI-ASC computer. The VAX files used by sigma code are listed below:

Unit Number	Name	Use	Preexisting
1	SIGRUNLOG	Log File	Yes
2	SIGBTOPOG	Bottom Topography	Yes
3	SIGTSPLOT	T-S Plot Data	
4	SIGBUOYIN	Buoyancy Coefficients	Yes
5	SIGINPUTD	Input Data	Yes
6	SIGPRINTF	Print File	
10	SIGUVPLOT	U-V Plot Data	
14	SIGBUOYOU	Buoyancy Coefficients(output)	
18	SIGINITIA	Initialization Data	Yes
19	SIGFORCEG	Forcing Data	Yes
26	SIGQCHEK1	Qcheck1 Print File	
27	SIGQCHEK2	Qcheck2 Print File	
40	SIGRESTRT	Restart Data	Yes
42	SIGDUMPFL	Dump File	
80	SIGWORKSP	Work Space	

These files noted as preexisting, must be available before the run, as needed.

Because it was not known what graphics software would be available on a particular VAX, no graphics device

output is currently installed. However, printer graphics are installed, and working as shown in Figure 7.

An estimate of relative timing is difficult, as VAX timing depends on many factors, including system loading. A crude estimate shows that the VAX version of the code runs about a factor of 120 slower than the ASC version. This is about the ratio that was expected.

6.0 Mediterranean Tests

The sigma code was setup to perform studies of the eastern basin of the Mediterranean Sea. The process involved routine setup tasks as well as two code modifications. The setup procedure, as well as the code modifications, will be discussed below.

6.1 Setup

The region was established as 10°-37°E, and 32°-38° N. This includes the eastern boundary, but cuts off several features at the north and south. Although the bottom topography was available at 10' intervals, a 20' spacing was chosen to reduce memory requirements for this problem. The numbers of lateral grid points are:

```
(37-10)*3+2=83      in the east-west direction, and
(38-32)*3+2=20      in the north-south direction.
```

Five vertical levels were used. The three code parameters IF, JF, and KF were reset, and a recompilation of relevant routines was performed.

The topography was created from the 10' data file by use of the program tested below (Note: All programs and listings referred to in this section can be found in Appendix E). A rigid wall was imposed on the topography at all lateral boundaries, exept for the Strait of Sicily, where the inflow-outflow occurs.

Since the forcing and initialization data lies on a polar-stereographic (PS) grid, the PS limits of the simulation region were determined. PS data was found to be required in the grid whose indices ran from I=45-50, and J=31-40.

An initialization file was created from climatology using the TAPER3 program. This was adequate for testing purposes. For a better initialization, the procedure of Section 3 of this report, may be used.

The forcing data was extracted from the data tape "SAIATM2", by use of the TAPER program. As shown in the listing, the data starts on January 7, 1977. A six hour interval was chosen.

6.2 Code Modifications

The original formulation for flux specified boundaries allowed only inflow or outflow at each edge. The full formulation, as described in Section 2.1, was implemented to allow bidirectional flow, as required in the Mediterranean Tests.

The second addition to the code was required because of a fundamental difficulty in the code. The code solves for the time evolution of a general variable x by the process,

$$\dot{x} = A(x)$$
$$x^{n+1} = x^n + F(\dot{x}, dt).$$

A is a representation of the model differential equations, and F is a fixing (stabilization) operator. For a simple explicit scheme $F(\dot{x},dt) = \dot{x}dt$. However, such a scheme is unstable, and very complicated procedures have been used to develop appropriate formulations for F, for the equations to be solved here (see references).

Since the Sigma Code solves a three dimensional problem in a minimum of computer memory, careful attention was paid to the code architecture. The problem is solved in slices, with intermediate quantities overwritten as each level is solved. This dictates the implementation of the fixing operator. Specifically, lateral fixing is performed during the vertical sweep, before the vertical fixing, which requires a knowledge of all the vertical levels.

The problem arises because the lateral fixing propagates the unstable solution horizontally, before the vertical fixing has modified the result. The vertical fixing can subsequently stabilize the solution at each point, due to the physics at each point. It cannot, however, stabilize the part of the instability which has been horizontally propagated.

In the past, this problem has been circumvented by turning off the lateral fixing, thus avoiding the horizontal propopagation of the instability. Because of the smaller lateral mesh spacing required in the

Mediterranean tests, however, the lateral fixing must be on.

One solution is to add a preliminary vertical diffusion model, before the horizontal fixing. This can take a number of forms. The simple solution implemented here is to limit $\dot{x}$ (i.e. $\dot{u}$), before the horizontal fixing process. A new routine DULIM, modeled on routine ULIM has been written. It sets

$$\dot{u} = \frac{V \cdot \dot{u}}{V + |\dot{u}|} ,$$

where $V = DUMAXN \cdot DT \cdot z_b$. DUMAXN is under input control, DT is the time step, and z_b is the local depth.

6.3 Results

A preliminary test run was performed. This simulation is intended to demonstrate that the code is properly setup to perform studies of the eastern Mediterranean. No attempt was made to model actual physical processes. Rather this run establishes procedures for modeling the eastern Mediterranean. Additionally, in the process of performing this test, problems with the code, when applied to this region, were identified and corrected.

It should be noted that in the figures which follow, problems, such as inadequate labeling of contour lines, are problems in the Disspla plotting package. They

result, in part, from the fact that the ASC computer center is using an out of date version of Disspla.

Figure 8 is a plot of depth values in the region. The values in the interior are the values obtained from the data file. The boundaries demonstrate the rigid wall that was articifically imposed. The one open spot is at the Strait of Sciliy. Because the labeling in the Disspla plot is sparse, a printer plot of the same data is shown in Figure 9. Since each contour is labeled by a letter, actual values can be read off this plot.

A two week interval was modeled using 56 time steps of 6 hours each. A great number of output plots can be produced from the data files which were generated during this run. Indeed, there is no limit to the data representations available. Most major quantities can be displayed on vertical slices of arbitrary great circle arcs. Additionally, horizontal slices can be displayed at arbitrary depths. The plotting programs perform the required interpolations, so that the spatial representation in the code does not impose limits on how the data may be displayed. A representative sample of possible output plots follows.

The general shape of the vertically integrated flux as shown in Figure 10, with actual values appearing in the printer plot of figure 11. The remainder of the plots

show quantities on the great circle with endpoints at 10° E, 35° N and 37° E, 35° N. The temperature is displayed in Figure 12. This figure has the depth adjusted so that the entire vertical extent of the simulation is shown. Figure 13 is the same display with the maximum depth adjusted to 600 m. Such a plot allows closer examination of surface dynamics. The same set of plots for salinity are shown in Figures 14 and 15. Once again the entire vertical domain, and a closer look at the surface are shown.

A similar set of plots were also generated from the velocity data. Figure 16 is a plot of u velocity. For this slice, a positive u velocity is a velocity approximately to the right. Since this is a display on a great circle arc, rather than an arc of constant latitude, the velocity is not exactly in the plane of the plot. Figure 17 is a plot of v velocity. Again, for this slice which runs approximately east-west, a positive v velocity is a velocity roughly into the page.

The last two plots, Figures 18 and 19, demonstrate the new ability of the code to plot the two components of the geostrophic velocity. The comments made in relation to the velocity also apply here.

6.4 Conclusion

The Sigma code is now working in the eastern basin of the Mediterranean. Externally supplied data has properly been integrated into the code for both bottom topography and initialization. In addition, a combined inflow-outflow condition at an open strait is working.

Actual simulation studies will involve longer runs. A detailed examination of the possible output displays, made in light of the topography of the region, will provide an insight into the processes at work. As such studies are performed, it may become evident that changes in the externally supplied data are necessary. These may include the addition of new data (e.g. wind forcing), or the use of better data than is currently used (e.g. EOTS rather than climatology).

REFERENCES

(1) Glyn O. Roberts, J. Laurence Seftor and Walter J. Gabowski, "A Sigma Coordinate Ocean Forecasting Computer Code, Part I. Model Differential Equations, Spatial Finite-Difference Representation, and Conservation Properties." September 1980. Report SAI-80-956-WA.

(2) Glyn O. Roberts and J. Laurence Seftor, "A Sigma Coordinate Ocean Forecasting Computer Code, Part II. Time Respresentation and Stability Properties." March 1980. Report SAI-80-957-WA.

(3) J. Laurence Seftor and Glyn O. Roberts, "A Sigma Coordinate Ocean Forecasting Computer Code, Part III. Code Description." November 1980. Report SAI-80-958-WA.

(4) J. Laurence Seftor, "A Sigma Coordinate Ocean Forecasting Computer Code, Part IV. Description of Graphics Capability." September 1980. Report SAI-81-262-WA.

(5) J. Laurence Seftor and Glyn O. Roberts, "A Sigma Coordinate Ocean Forecasting Computer Code, Part V. Results." December 1980. Report SAI-81-299-WA.

(6) J. Laurence Seftor, "Description of Revised Program TAPER for Data Tape Processing." September 1982. Report SAI-83-941-WA.

(7) Glyn O. Roberts, "Open Boundary Conditions in Ocean Forecasting." November 1982. Report SAI-83-996-WA.

(8) J. Laurence Seftor, "Description of the Use of the SAI/NORDA Sigma Co-ordinate Ocean Forecasting Code with Externally Supplied Data." September 1982. Report SAI-83-940-WA.

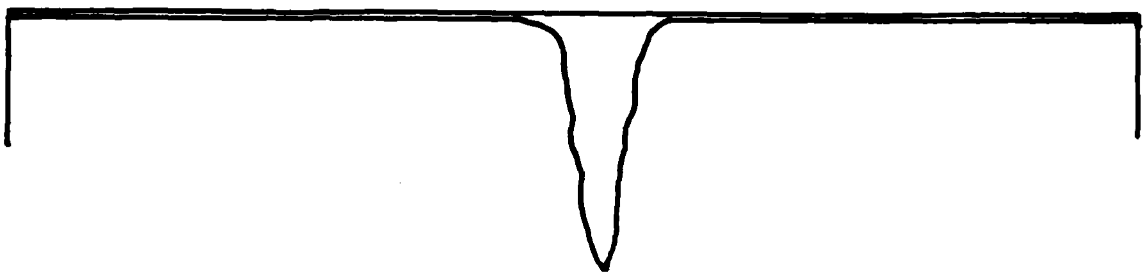


Figure 1
Depth profile at side of system, showing strait

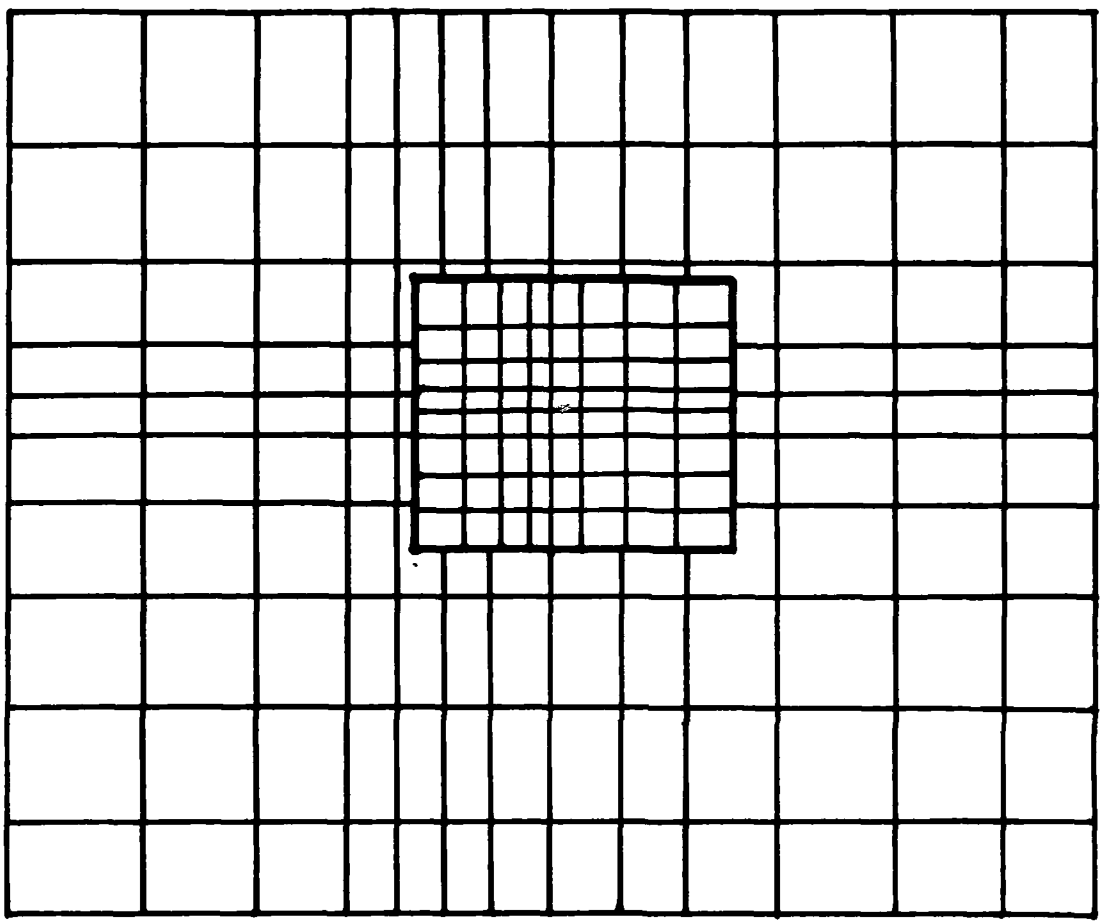


Figure 2
Lateral mesh spacing, with imbedded grid

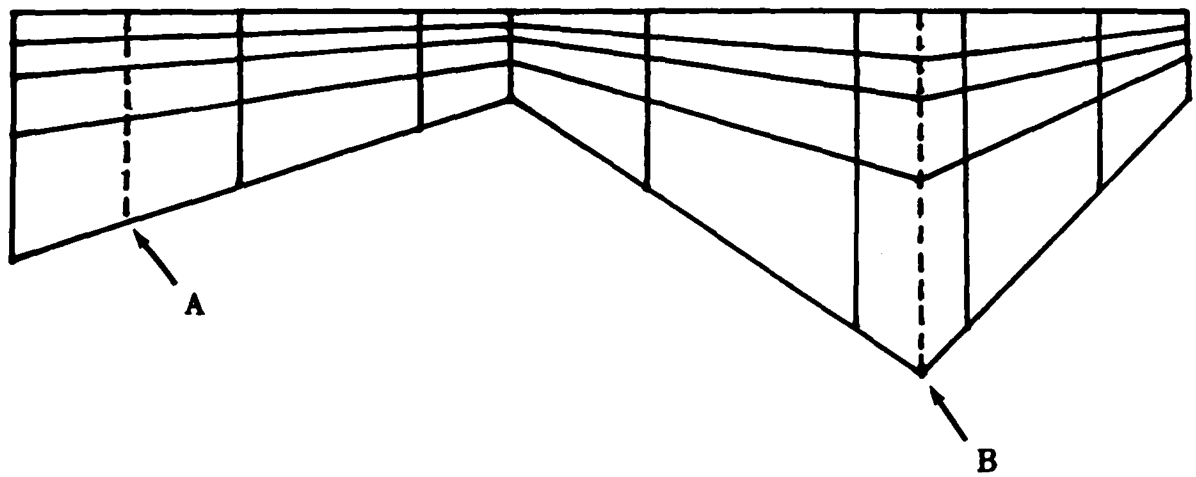


Figure 3
Typical depth profile

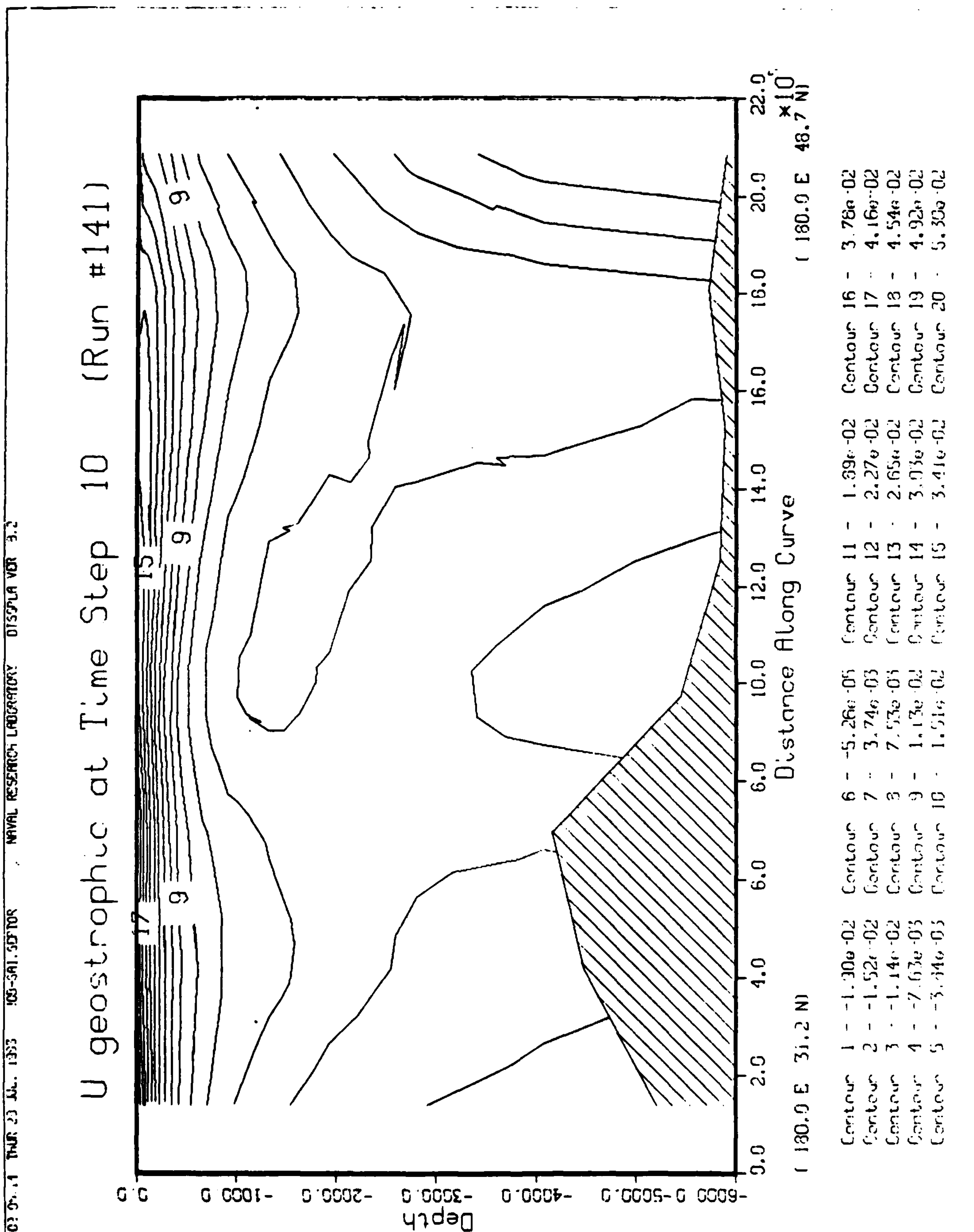


Figure 4

Sample Plot of Geostrophic Velocity

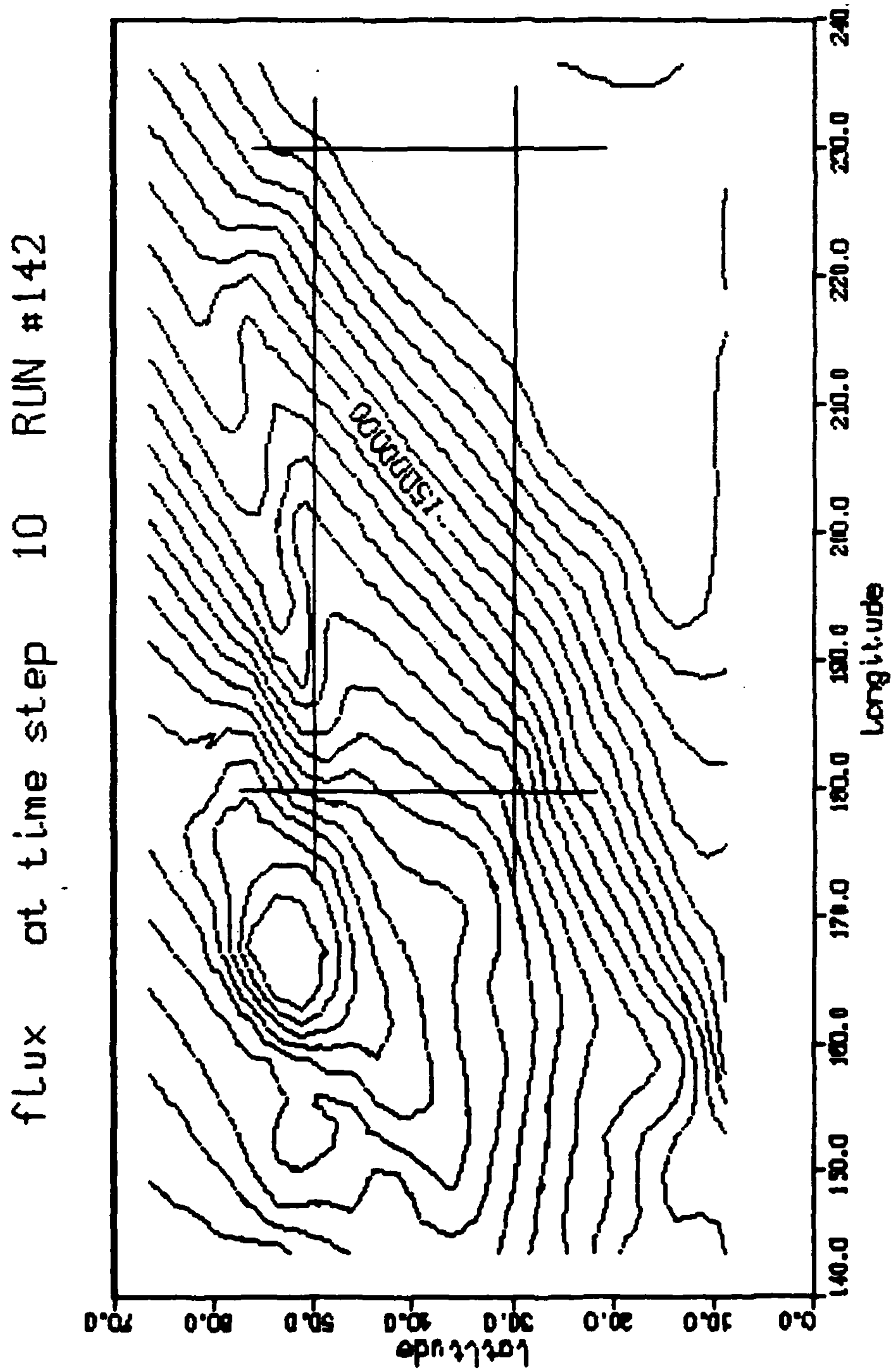


Figure 5
Sample plot of Barotropic Stream Function

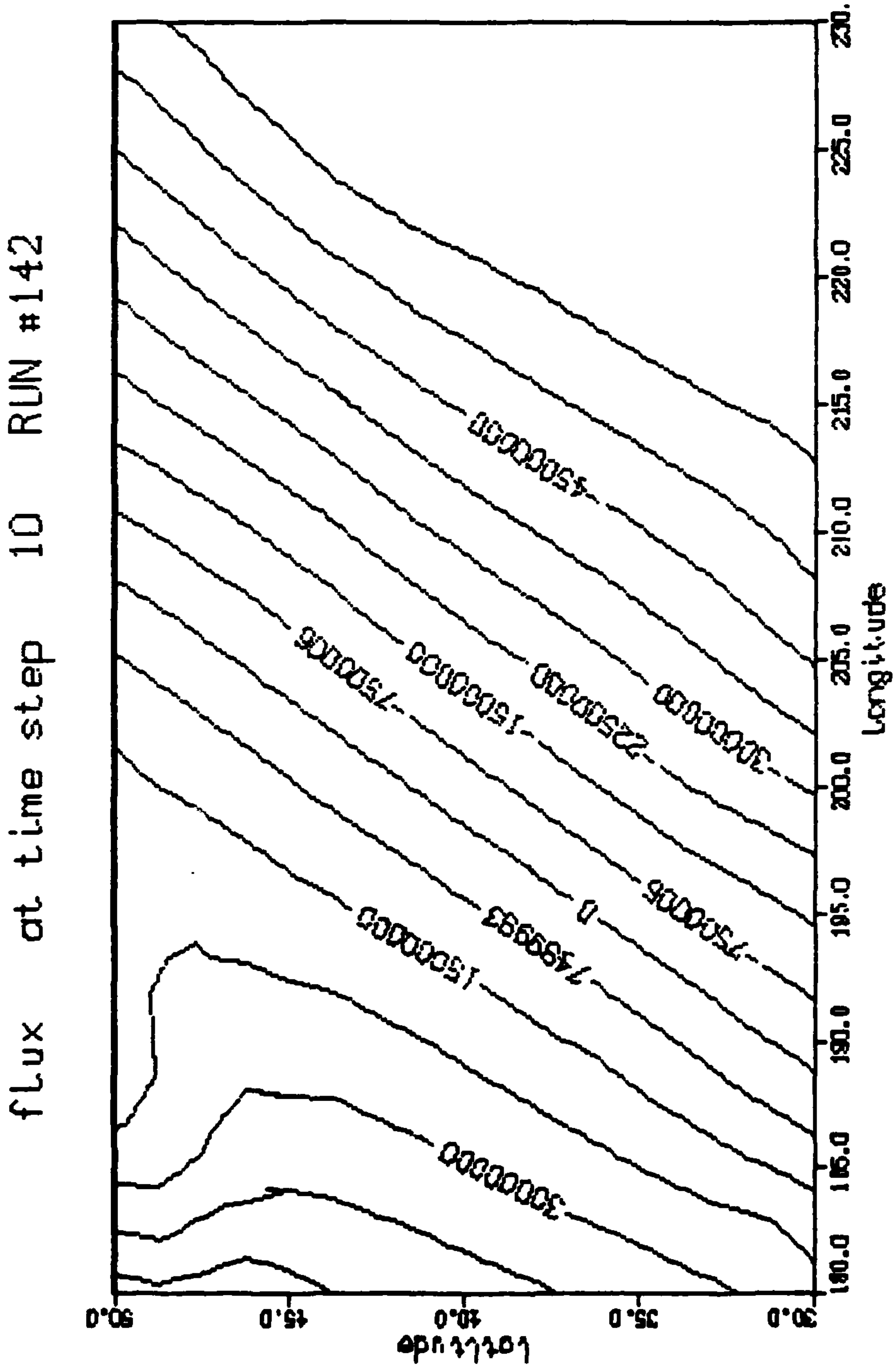


Figure 6

Sample Plot of Barotropic Stream Function (expanded view)

TEMPERATURE AT TIME STEP 10 (DEPTH= 100.0 M) RUN #136

THE CONTOURS ARE DEFINED AS FOLLOWS:

a = -4.557E-01	E = 1.127E+01	J = 2.299E+01
A = 1.889E+00	F = 1.361E+01	
B = 4.233E+00	G = 1.596E+01	
C = 6.578E+00	H = 1.830E+01	
D = 8.922E+00	I = 2.064E+01	

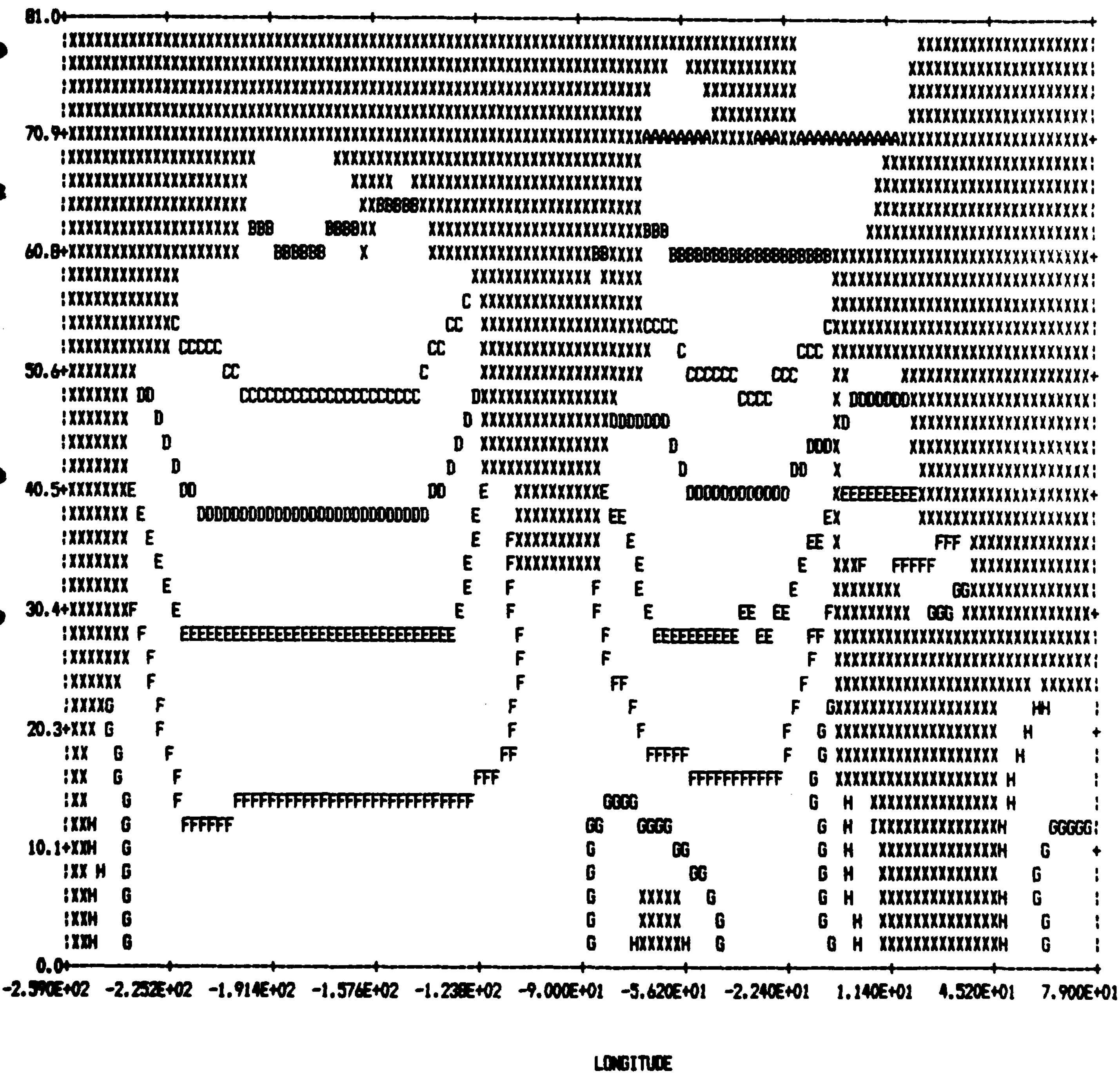
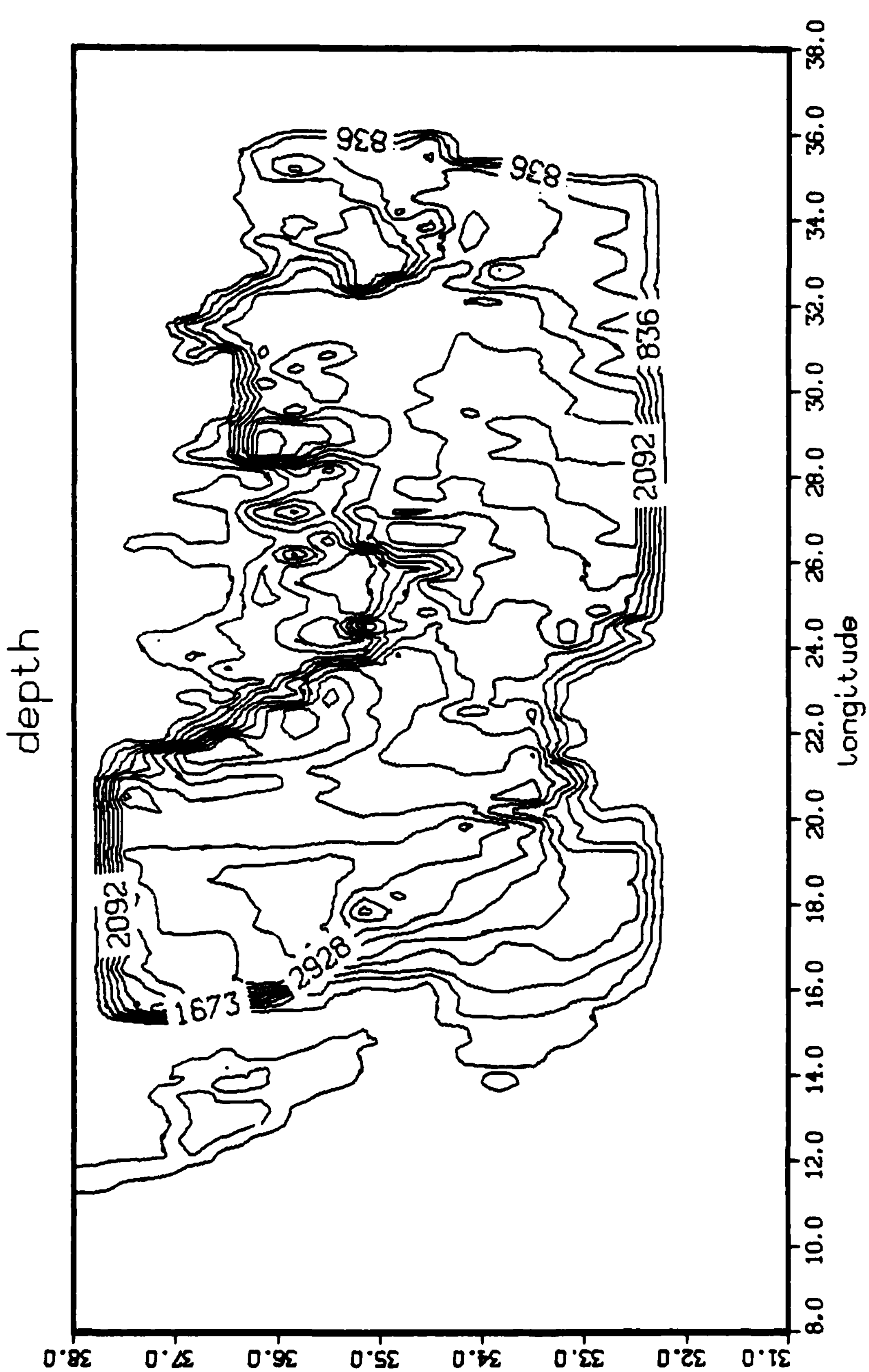


Figure 7
VAX Output Plot



depth
longitude
latitude
836
2092
1673
2928
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0

Figure 8

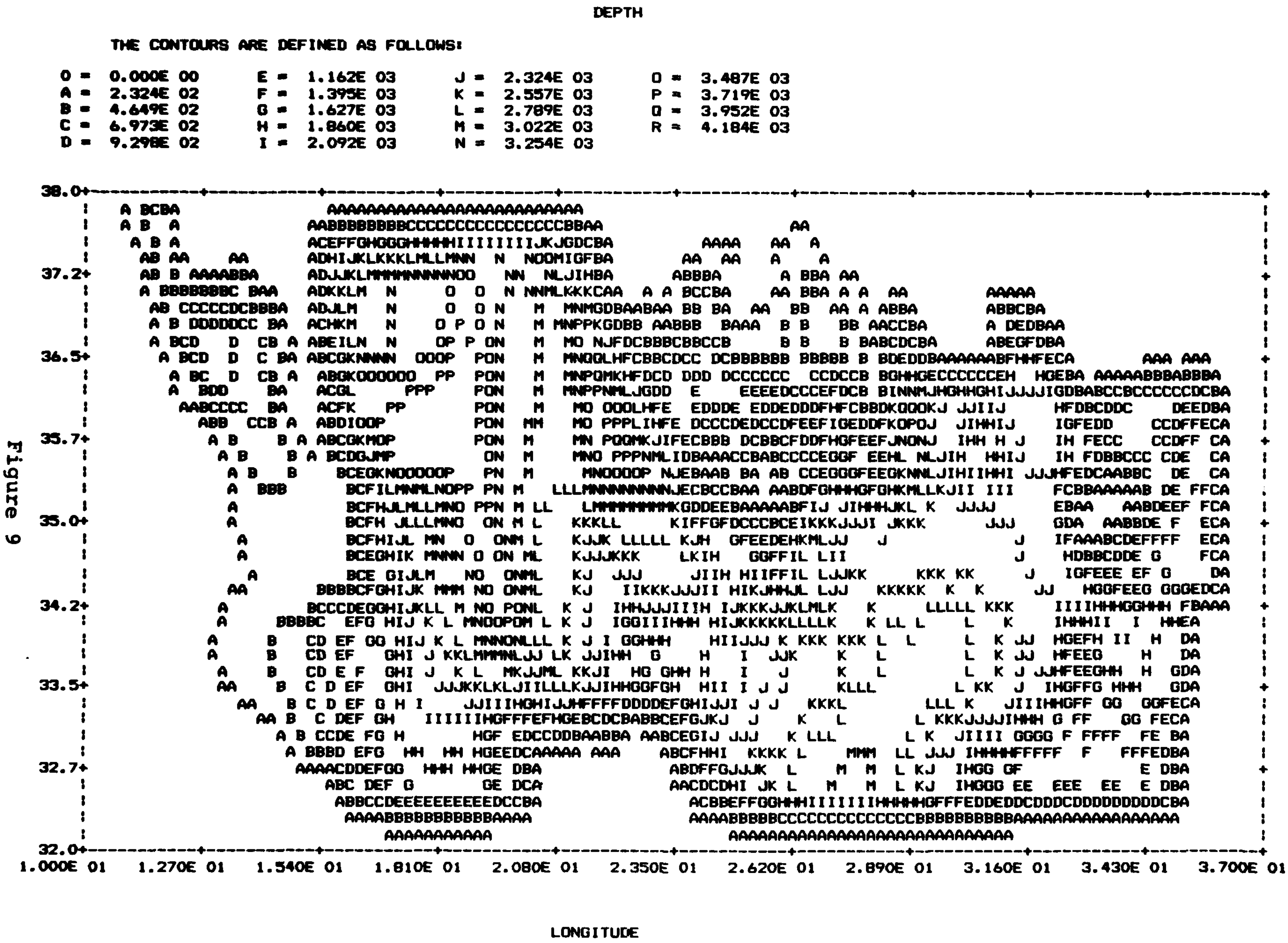

DEPTH
THE CONTOURS ARE DEFINED AS FOLLOWS:
0 = 0.000E 00
A = 2.324E 02
B = 4.649E 02
C = 6.973E 02
D = 9.298E 02
E = 1.162E 03
F = 1.395E 03
G = 1.627E 03
H = 1.860E 03
I = 2.092E 03
J = 2.324E 03
K = 2.557E 03
L = 2.789E 03
M = 3.022E 03
N = 3.254E 03
O = 3.487E 03
P = 3.719E 03
Q = 3.952E 03
R = 4.184E 03
38.0
37.2
36.5
35.7
35.0
34.2
33.5
32.7
32.0
1.000E 01
1.270E 01
1.540E 01
1.810E 01
2.080E 01
2.350E 01
2.620E 01
2.890E 01
3.160E 01
3.430E 01
3.700E 01
LONGITUDE

Figure 9

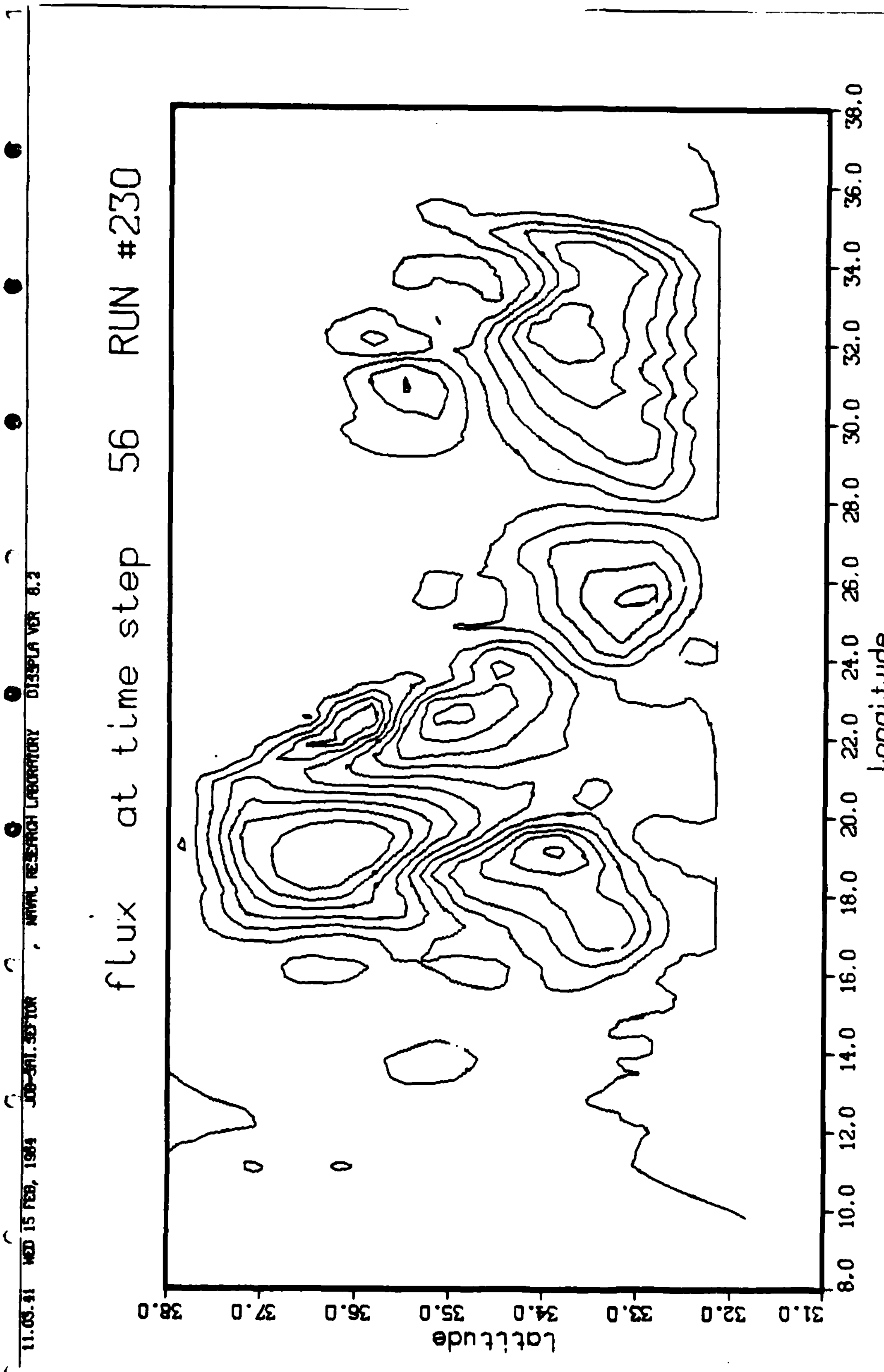

flux at time step 56 RUN #230
longitude
latitude
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
PLOT 2 11.05.41 WED 15 FEB, 1984 JOB-SAT.SEFTOR , NAVAL RESEARCH LABORATORY DISSPLA VER 8.2

Figure 10

FLUX AT TIME STEP 56 (RUN #230)

THE CONTOURS ARE DEFINED AS FOLLOWS:

i = -1.000E 07	d = -4.444E 06	A = 1.111E 06	F = 6.667E 06
h = -8.889E 06	c = -3.333E 06	B = 2.222E 06	G = 7.778E 06
g = -7.778E 06	b = -2.222E 06	C = 3.333E 06	H = 8.889E 06
f = -6.667E 06	a = -1.111E 06	D = 4.444E 06	I = 1.000E 07
e = -5.556E 06	0 = 0.000E 00	E = 5.556E 06	

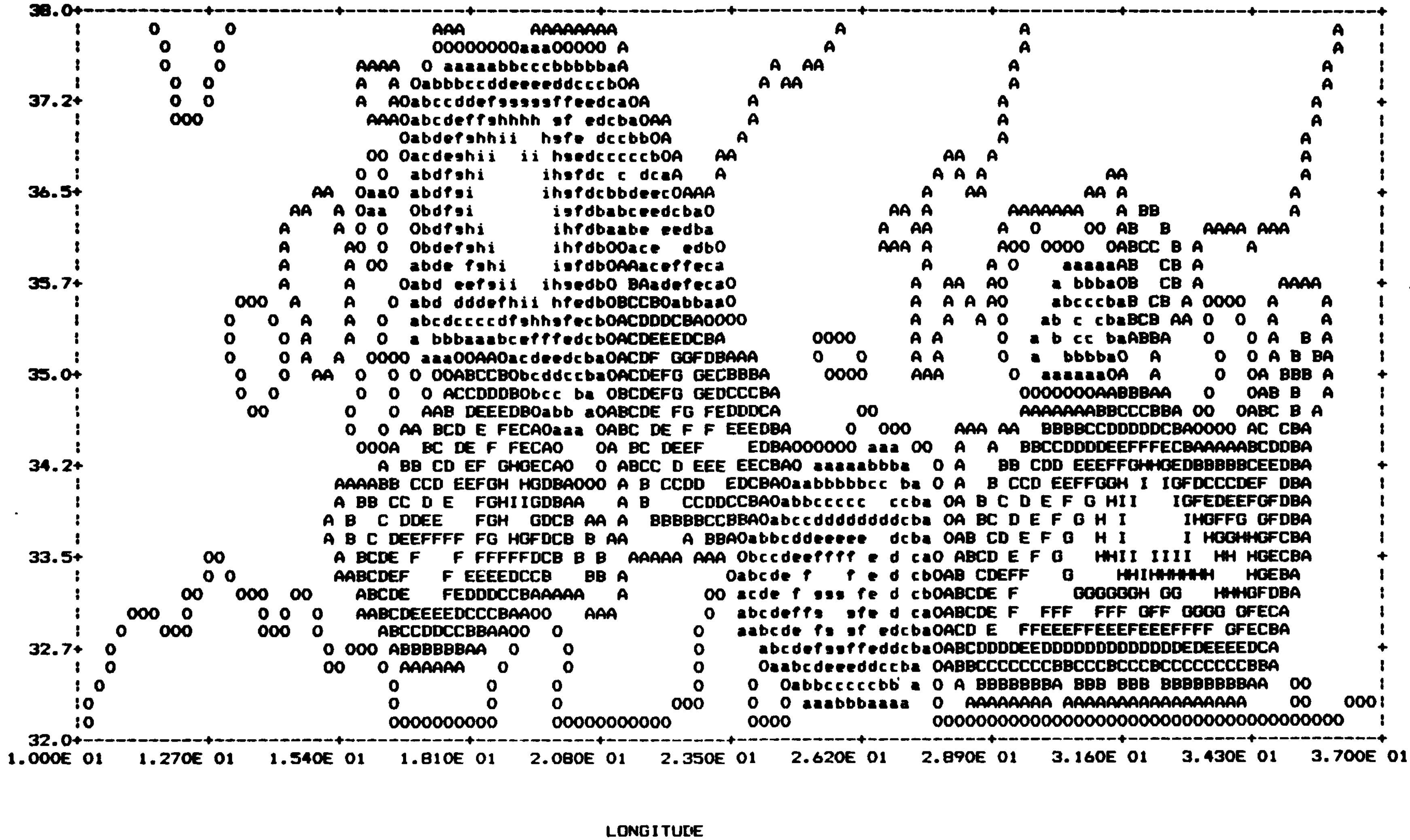


Figure 11

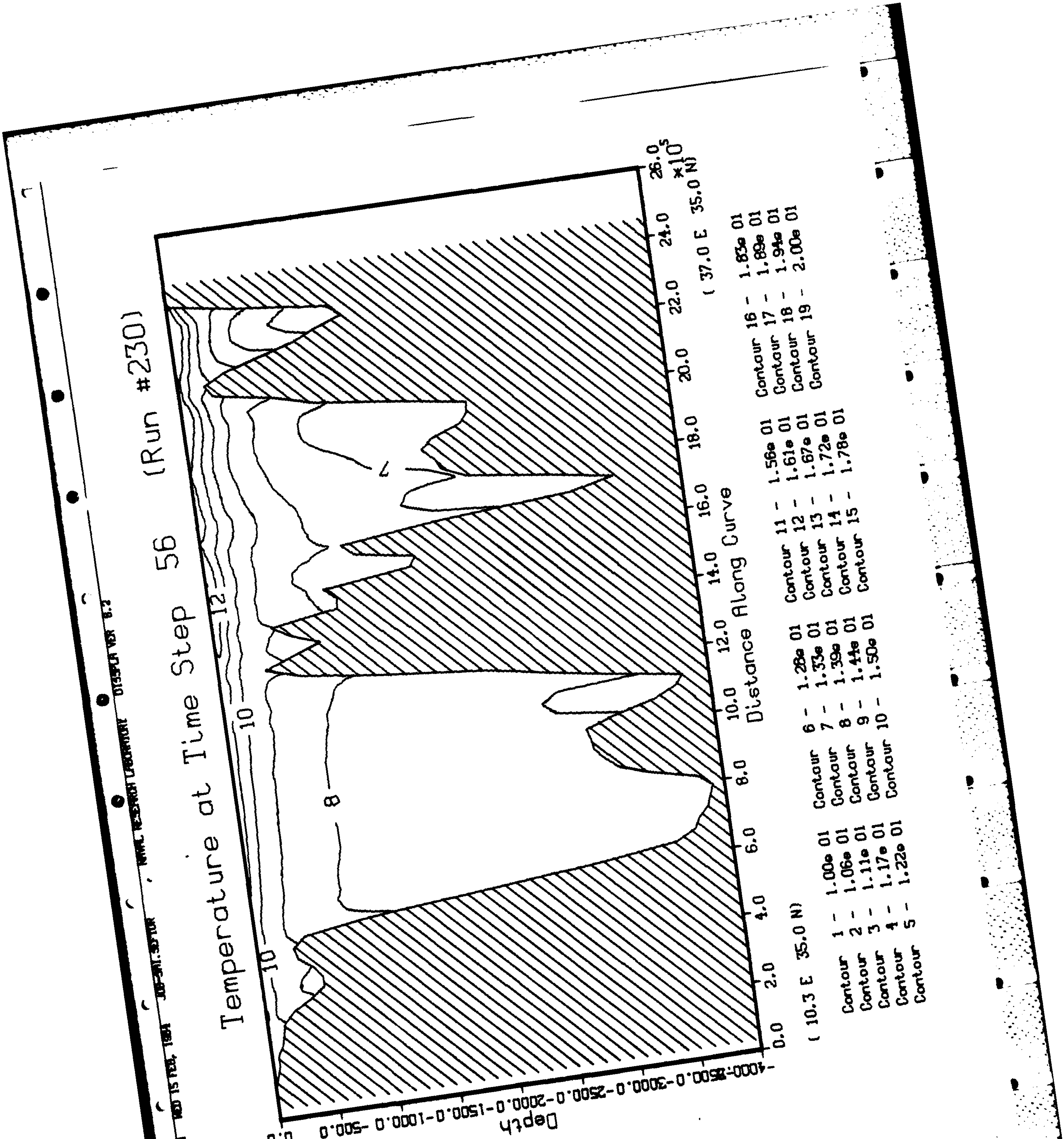
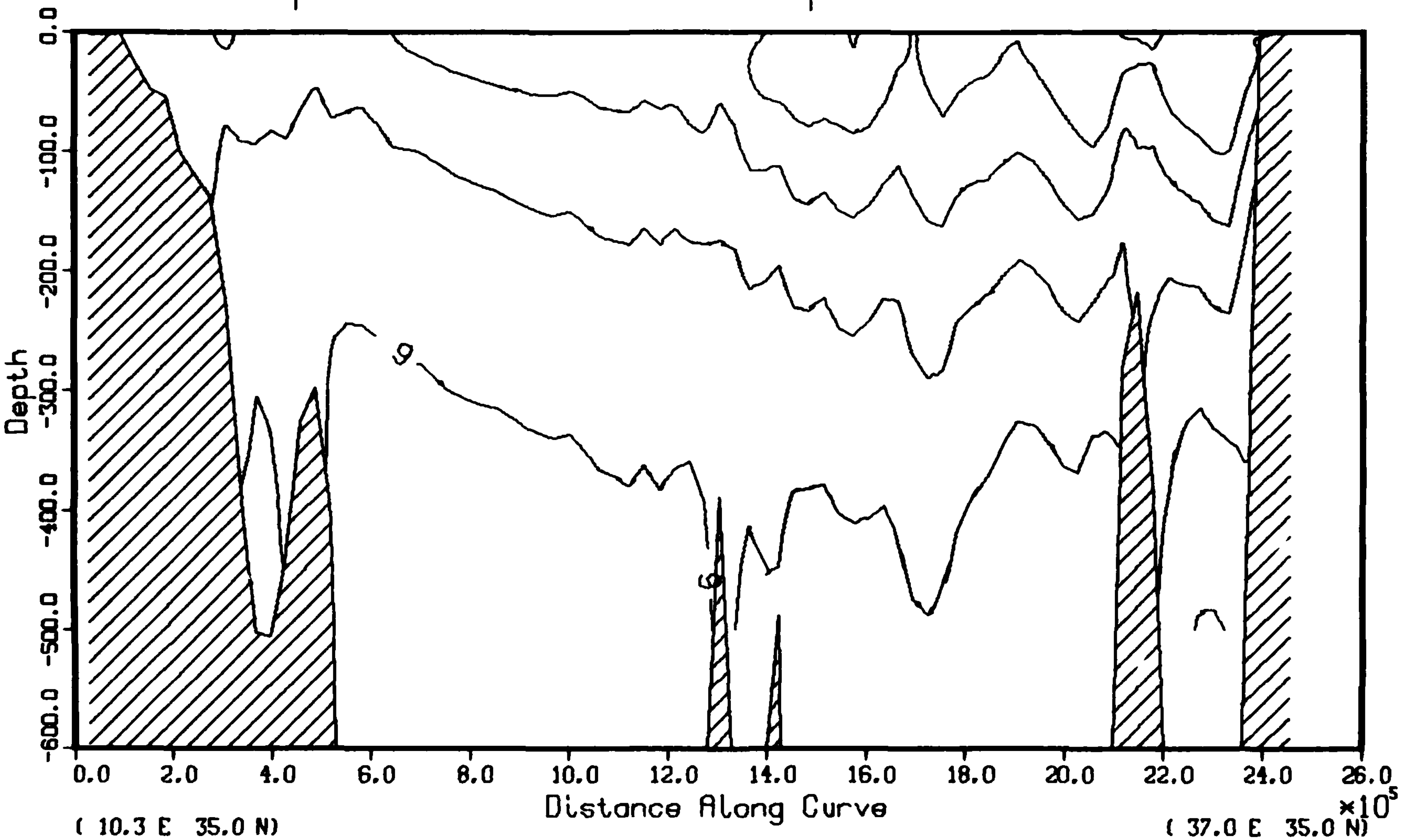

Temperature at Time Step 56 (Run #230)
Depth
0.0 -500.0 -1000.0 -1500.0 -2000.0 -2500.0 -3000.0 -3500.0 -4000.0
Distance Along Curve
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0
x10^5
(10.3 E 35.0 N)
(37.0 E 35.0 N)
10
8
10
12
7
Contour 1 - 1.00e 01
Contour 2 - 1.06e 01
Contour 3 - 1.11e 01
Contour 4 - 1.17e 01
Contour 5 - 1.22e 01
Contour 6 - 1.28e 01
Contour 7 - 1.33e 01
Contour 8 - 1.39e 01
Contour 9 - 1.44e 01
Contour 10 - 1.50e 01
Contour 11 - 1.56e 01
Contour 12 - 1.61e 01
Contour 13 - 1.67e 01
Contour 14 - 1.72e 01
Contour 15 - 1.78e 01
Contour 16 - 1.83e 01
Contour 17 - 1.89e 01
Contour 18 - 1.94e 01
Contour 19 - 2.00e 01

Figure 12

PLOT 1 11.42.03 WED 15 FEB, 1984 JOB=SRI.SEFTOR , NAVAL RESEARCH LABORATORY DISSPLA VER 8.2

Temperature at Time Step 56 (Run #230)



Contour 1 -	1.00e 01	Contour 6 -	1.28e 01	Contour 11 -	1.56e 01	Contour 16 -	1.83e 01
Contour 2 -	1.06e 01	Contour 7 -	1.33e 01	Contour 12 -	1.61e 01	Contour 17 -	1.89e 01
Contour 3 -	1.11e 01	Contour 8 -	1.39e 01	Contour 13 -	1.67e 01	Contour 18 -	1.94e 01
Contour 4 -	1.17e 01	Contour 9 -	1.44e 01	Contour 14 -	1.72e 01	Contour 19 -	2.00e 01
Contour 5 -	1.22e 01	Contour 10 -	1.50e 01	Contour 15 -	1.78e 01		

Figure 13

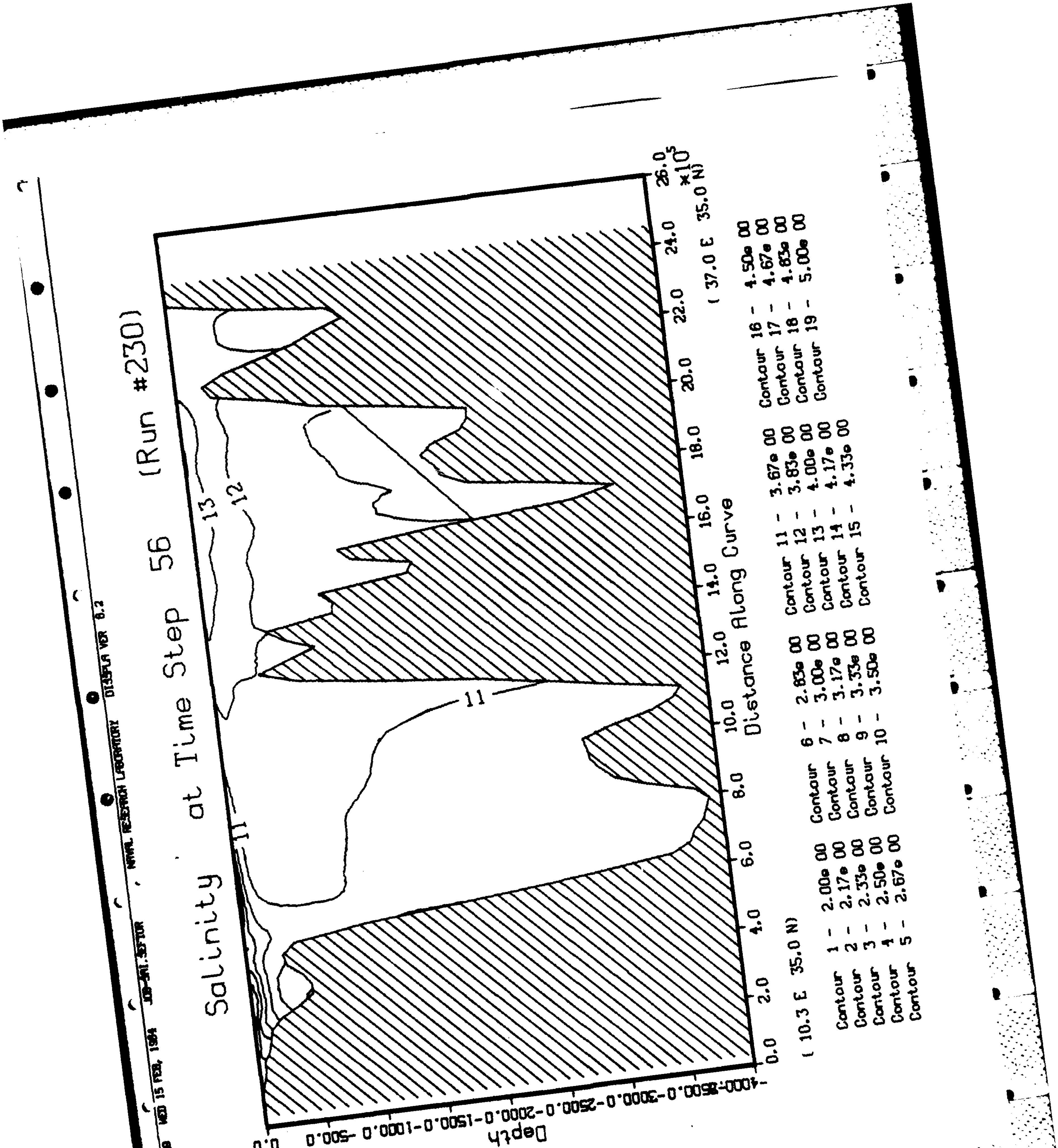
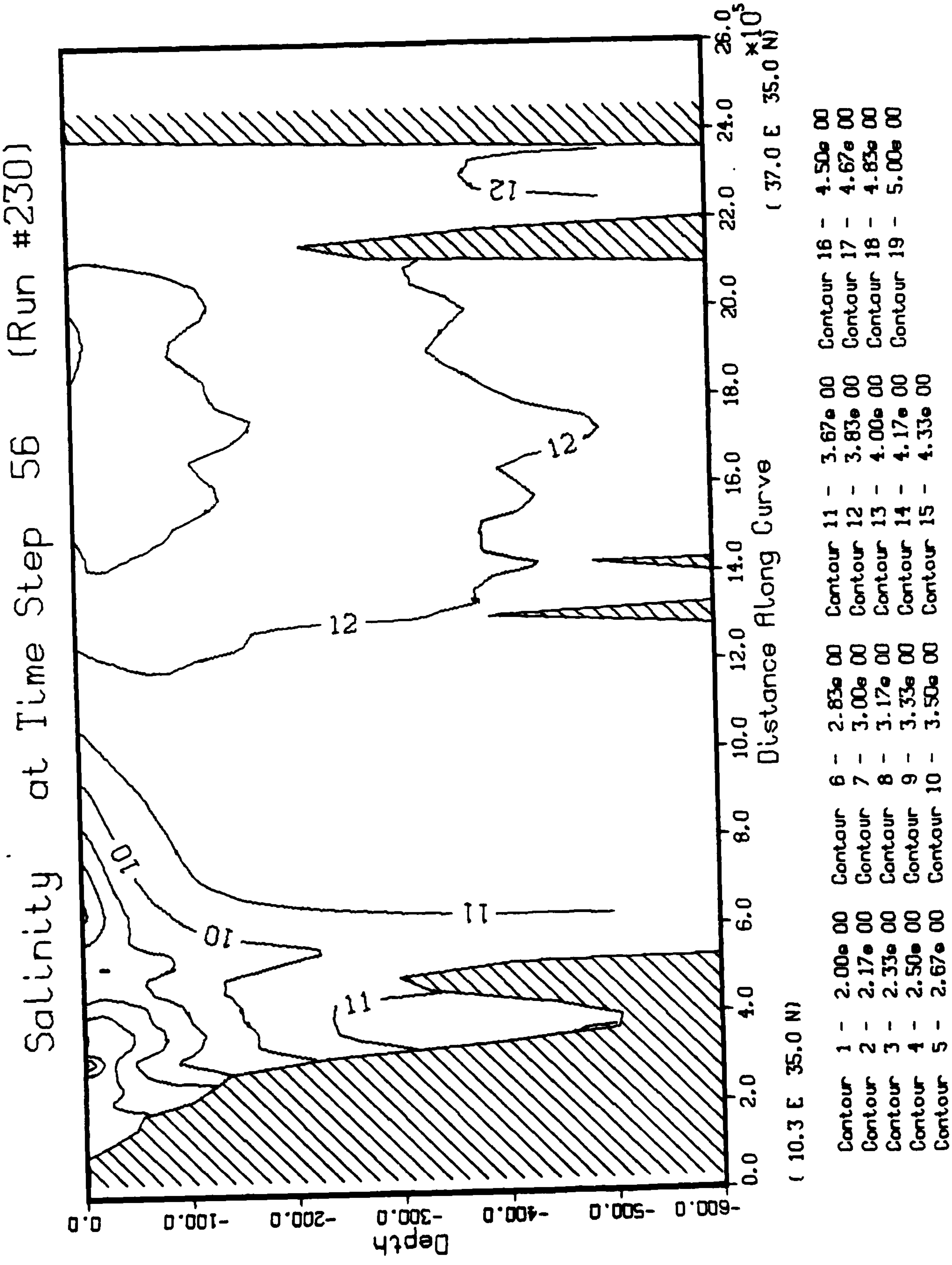
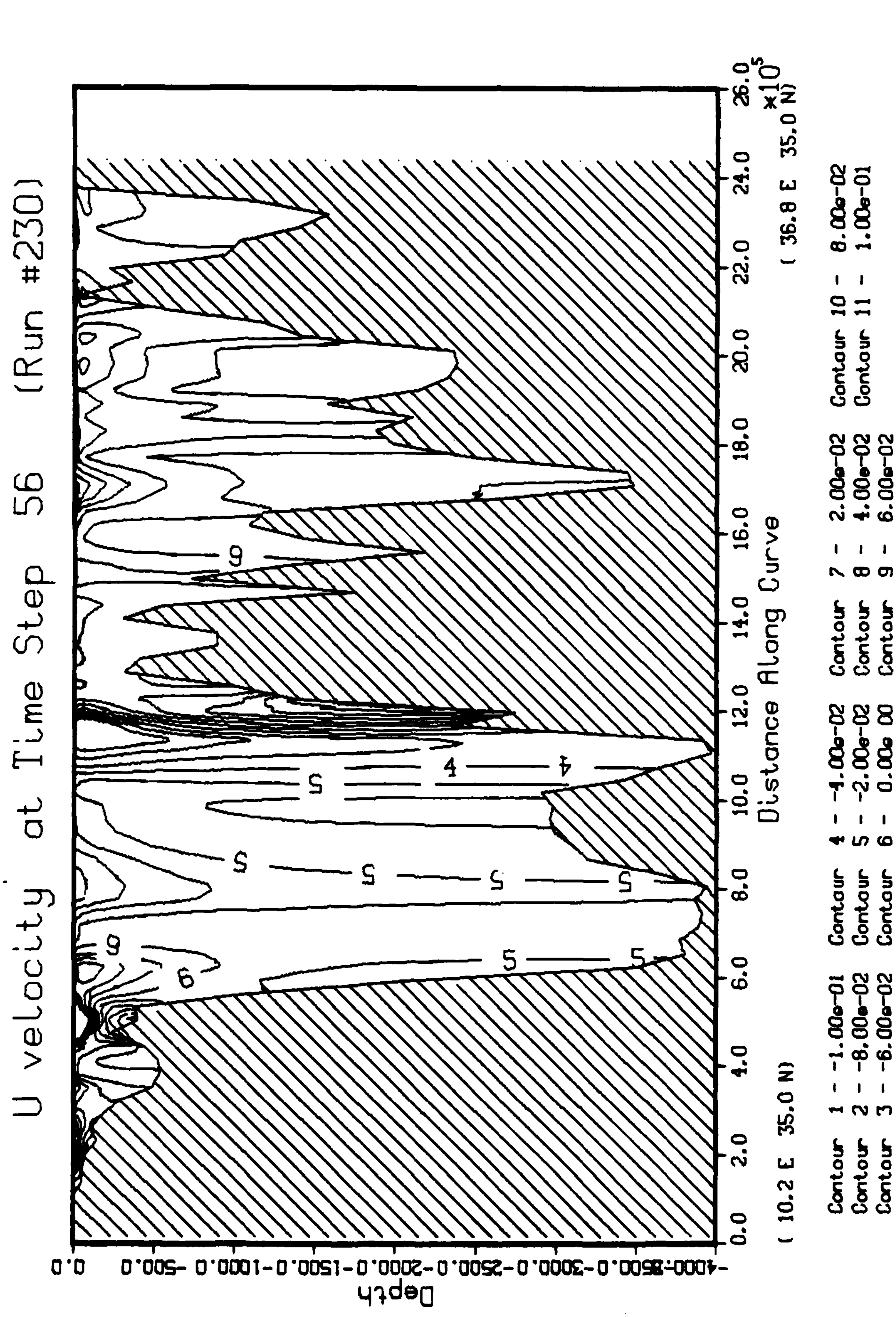

PLOT 2 15.48.48 WED 15 FEB, 1984 JOB=SAL.35FTOR , NAVAL RESEARCH LABORATORY DISSPLA VER 8.2
Salinity at Time Step 56 (Run #230)
Depth
0.0 -500.0 -1000.0 -1500.0 -2000.0 -2500.0 -3000.0 -3500.0 -4000.0
Distance Along Curve
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0
x10^5
(10.3 E 35.0 N)
(37.0 E 35.0 N)
11
11
12
13
Contour 1 - 2.00e 00
Contour 2 - 2.17e 00
Contour 3 - 2.33e 00
Contour 4 - 2.50e 00
Contour 5 - 2.67e 00
Contour 6 - 2.83e 00
Contour 7 - 3.00e 00
Contour 8 - 3.17e 00
Contour 9 - 3.33e 00
Contour 10 - 3.50e 00
Contour 11 - 3.67e 00
Contour 12 - 3.83e 00
Contour 13 - 4.00e 00
Contour 14 - 4.17e 00
Contour 15 - 4.33e 00
Contour 16 - 4.50e 00
Contour 17 - 4.67e 00
Contour 18 - 4.83e 00
Contour 19 - 5.00e 00

Figure 14



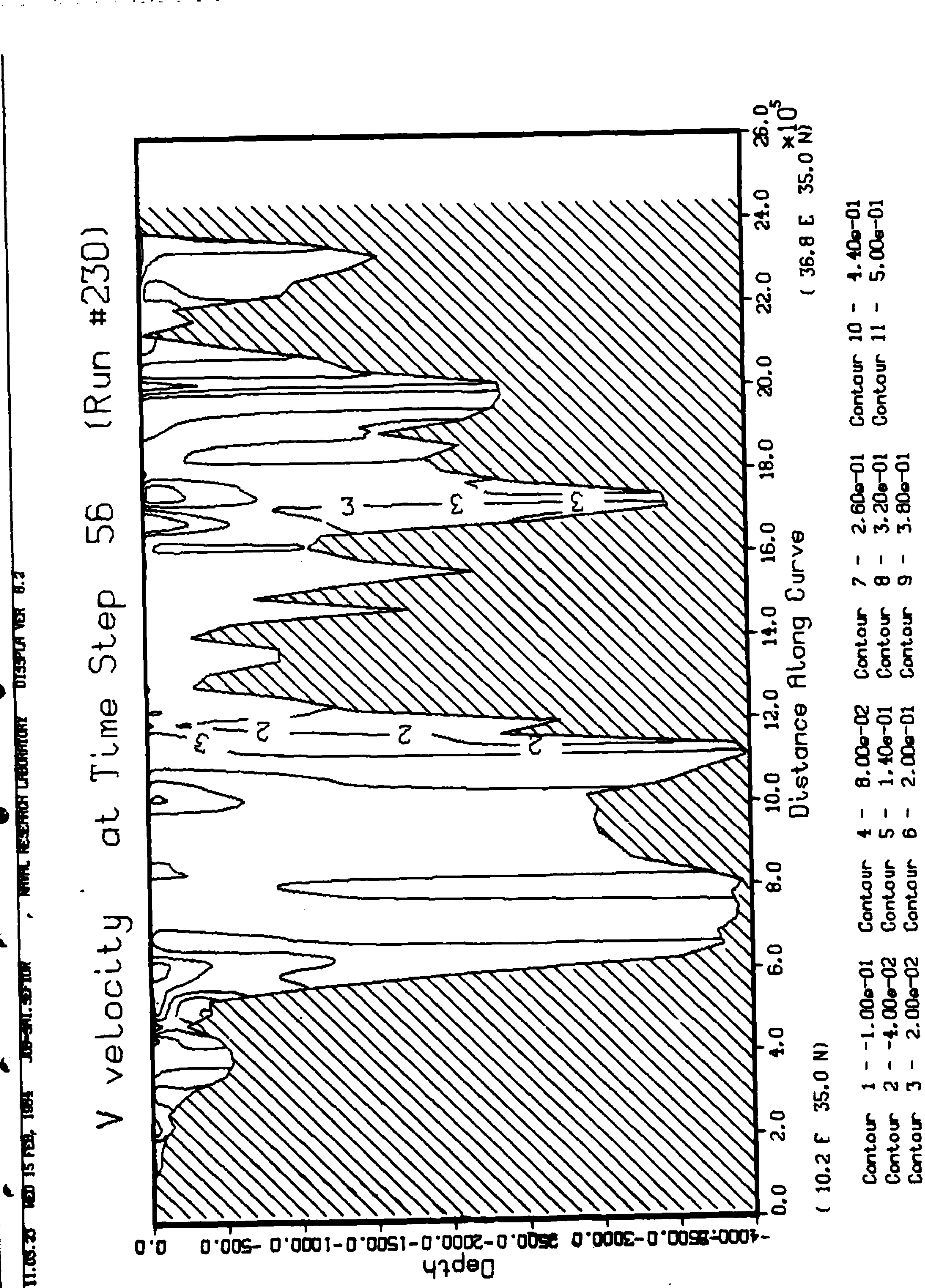
Salinity at Time Step 56 (Run #230)
Depth
0.0
-100.0
-200.0
-300.0
-400.0
-500.0
-600.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
$\times 10^5$
Distance Along Curve
(10.3 E 35.0 N)
(37.0 E 35.0 N)
10
11
12
Contour 1 - 2.00e 00
Contour 2 - 2.17e 00
Contour 3 - 2.33e 00
Contour 4 - 2.50e 00
Contour 5 - 2.67e 00
Contour 6 - 2.83e 00
Contour 7 - 3.00e 00
Contour 8 - 3.17e 00
Contour 9 - 3.33e 00
Contour 10 - 3.50e 00
Contour 11 - 3.67e 00
Contour 12 - 3.83e 00
Contour 13 - 4.00e 00
Contour 14 - 4.17e 00
Contour 15 - 4.33e 00
Contour 16 - 4.50e 00
Contour 17 - 4.67e 00
Contour 18 - 4.83e 00
Contour 19 - 5.00e 00

Figure 15



U velocity at Time Step 56 (Run #230)
Depth
0.0 -500.0 -1000.0 -1500.0 -2000.0 -2500.0 -3000.0 -3500.0 -4000.0
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0
$\times 10^5$
(10.2 E 35.0 N)
(36.8 E 35.0 N)
Distance Along Curve
Contour 1 - -1.00e-01
Contour 2 - -8.00e-02
Contour 3 - -6.00e-02
Contour 4 - -4.00e-02
Contour 5 - -2.00e-02
Contour 6 - 0.00e 00
Contour 7 - 2.00e-02
Contour 8 - 4.00e-02
Contour 9 - 6.00e-02
Contour 10 - 8.00e-02
Contour 11 - 1.00e-01

Figure 16



V velocity at Time Step 56 (Run #230)
Distance Along Curve
Depth
(10.2 E 35.0 N)
(36.8 E 35.0 N)
$\times 10^5$
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
0.0
-500.0
-1000.0
-1500.0
-2000.0
-2500.0
-3000.0
-3500.0
-4000.0
Contour 1 - -1.00e-01
Contour 2 - -4.00e-02
Contour 3 - 2.00e-02
Contour 4 - 8.00e-02
Contour 5 - 1.40e-01
Contour 6 - 2.00e-01
Contour 7 - 2.60e-01
Contour 8 - 3.20e-01
Contour 9 - 3.80e-01
Contour 10 - 4.40e-01
Contour 11 - 5.00e-01

Figure 17

PLOT 3 11.04.08 WED 15 FEB, 1984 JOB-SNT.SEPTOR , NAVAL RESEARCH LABORATORY DISSPLA VER 8.2

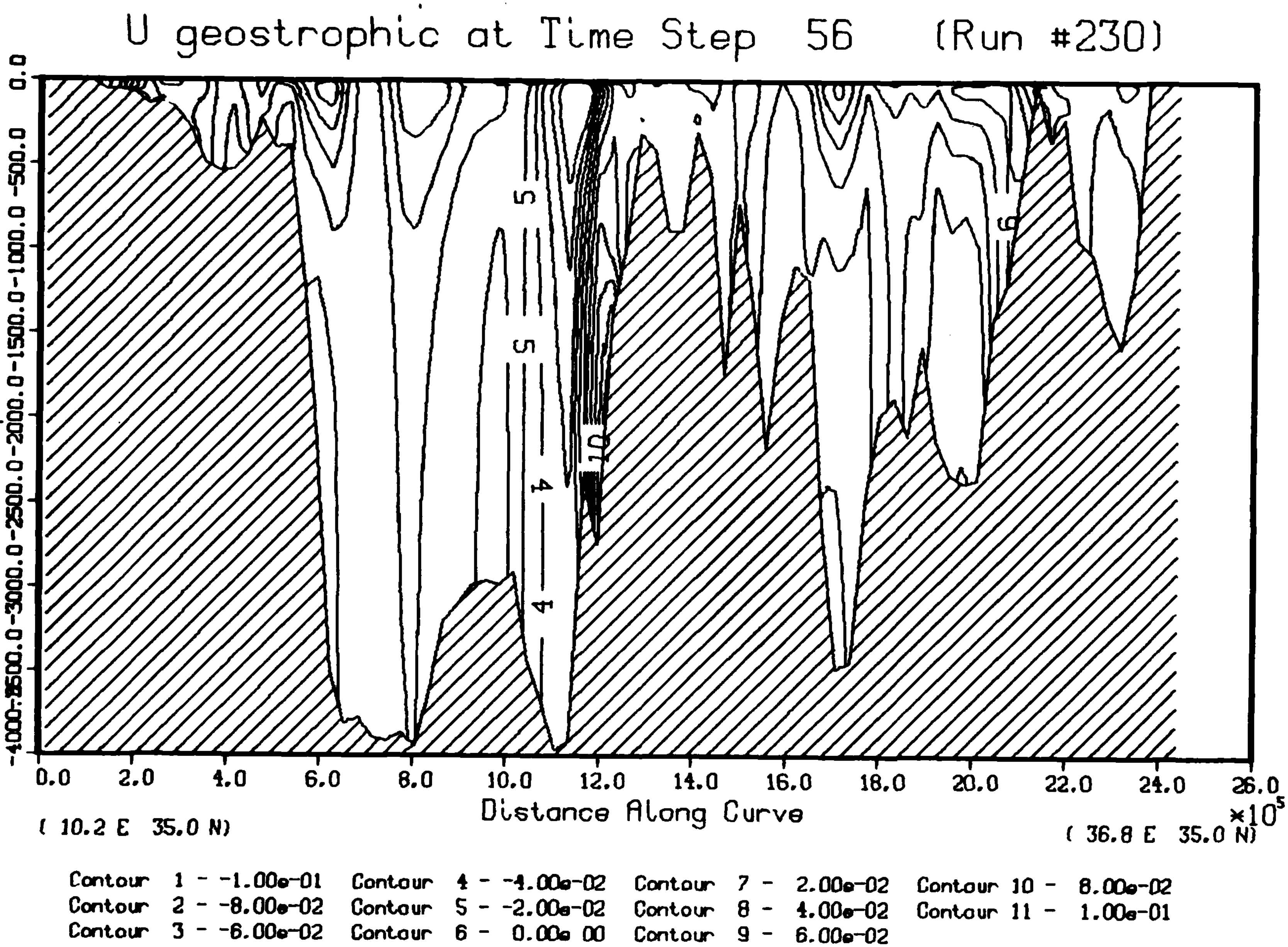


Figure 18

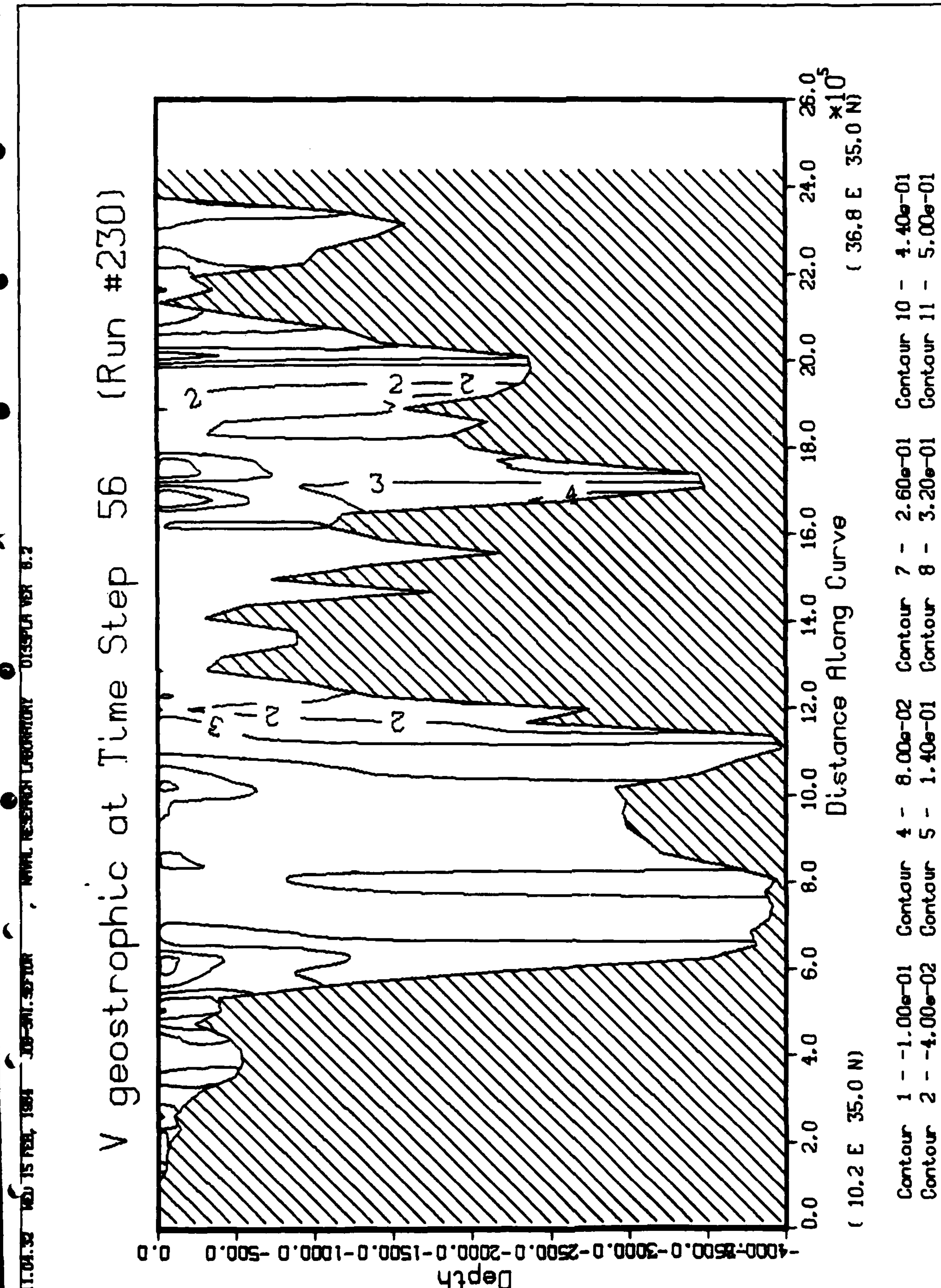

V geostrophic at Time Step 56 (Run #230)
Distance Along Curve
Depth
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0
*10^5
(10.2 E 35.0 N)
(36.8 E 35.0 N)
0.0 -500.0 -1000.0 -1500.0 -2000.0 -2500.0 -3000.0 -3500.0 -4000.0
2
3
4
Contour 1 - -1.00e-01
Contour 2 - -4.00e-02
Contour 3 - 2.00e-02
Contour 4 - 8.00e-02
Contour 5 - 1.40e-01
Contour 6 - 2.00e-01
Contour 7 - 2.60e-01
Contour 8 - 3.20e-01
Contour 9 - 3.80e-01
Contour 10 - 4.40e-01
Contour 11 - 5.00e-01
PLOT 4 11.04.32 WED 15 FEB, 1984 JOB=SWI.SOPTOR , NAVAL RESEARCH LABORATORY DISSPLA VER 8.2

Figure 19

Appendix A

Sigma Code Updates

```
SMS VERSION 5.27    LISTING OF DECK    A A N A M L                                    01/12/84          PAGE 1

*** SMS189 : DECK AANAML   IS EDITED FROM SPL       FILE
CREATED ON 03/23/82 AT 10:26:18           LAST UPDATED ON 12/05/83 AT 13:40:29 BY SMS VERSION 5.27
LANGUAGE:                 USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L081683A  L0816838  L120583A

   NAMELIST/ONE/AINV,CG,RC,LSU,RHOO,G,BETAH,BETAV,CV,ZV,DELT,CD,RARO          AANAML       1
 . , OMEGA,FO,FIXZS,ADJZS,FIXINT,ADJINT                                       AANAML       2
 . , TMAX,TINMN,SALT,UMAX,DT,NSTEP                                            AANAML       3
 . , SURFA,FIXTS,THTSLA,THTSPA,THTSSA,THTSLO,THTSPD,THTSSD                    AANAML       4
 . , FIXUV,THUVLA,THUVPA,THUVSA,THUVLD,THUVPD,THUVSD                          AANAML       5
 . , THUVF,HOUR,VFIXUV,PC,CASE,SMOOTH,KS,ZSM                                  AANAML       6
 . , IPC,HBATTN,DTMULT,DTMAX,DMPGPI                                           AANAML       7
 . , AUPWND,ASMZSM,OLDPI,DOFPII,DMPPII                                        AANAML       8
 . , NGRPPT,GSURF,NZSITR,ZSFERR,ZSFCHK                                        AANAML       9
 . , CJCOEF,OJCOEF,ZSINI,CZSINI,ZSFLCR                                        AANAML      10
 . , ZSFA,UVFDIV,REFBM,REFBF,ZSINMN                                           AANAML      11
 . , DELTTS,NPPAGE,REFBR,URMULT,TINDEP                                        AANAML      12
 . , IFNITR,FIA,FIERR,WOTCHK,FICHK,KVM,UMAXN                                  AANAML      13
 . , FORCIN,FTMTCH,VFIXTS,CONDEN                                              AANAML      14
 . , CRH,ZCRH,FLUXIN,DINFL,DBOTBL                                             L0816838     3
 . , NREGON,SAVSTR,SAVINC,SAVPLO,SAVPHI,SAVLLO,SAVLHI                         L120583A     3
   NAMELIST/TWO/DUM                                                           AANAML      15

   17 ACTIVE LINE(S)            1 INACTIVE LINE(S)

*E ALLMAC
```

```
*** SMSIN9 : DECK ALLMAC   IS EDITED FROM SPL      FILE
CREATED ON 06/18/79 AT 13:45:11          LAST UPDATED ON 12/27/83 AT 17:58:37 BY SMS VERSION 5.27
LANGUAGE: FORTRAN      USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: VTSFX170  LUVFX184  FIX184A   FIX192A   FIX194A   FIX194B   FIX201F   FIX211A   F256D
     F256E     F292A     F299A     DMPGPI    F310B     UPWINDI   DMPGPI2   F319A     PISWEEP1  PISWEEPS  PISWEEP6  F1207A
     F0104A    F0107A    F0131A    F0204A    F0205A    F0212C    F0221A    F0226D    F0306A    F0307C    F0314B    F0319C
     F0320A    F0331A    F0407C    F0407F    F0408A    F0408B    F0417A    F0417C    F0422B    F0430A    F0513A    F0530A
     F0627A    F0627B    F0728B    F0723A    F0723B    F0725C    F0807A    F0825A    F1010A    F1010B    F1020A    F1021A
     F1023B    F1023E    F1027D    F1223A    F010681A  F010681D  L071501A  L072801A  L080501C  L080601A  L081301A  L032302A
     L040802A  L092382A  L072683B  L072783B  L081583A  L081683A  L082983B  L120583A  L122083A  L122783A

     *                                                                       L081583A     3
     *    STUDY GULF OF MEXICO                                               L081583A     4
     *                                                                       L081583A     5
          PARAMETER IF=52,  JF=35,  KF=5                                     L081583A     6
        . . IFP1=IF+1,JFP1=JF+1,KFP1=KF+1                                    ALLMAC       2
        . . IFM1=IF-1,JFM1=JF-1,KFM1=KF-1                                    ALLMAC       3
        . . IFM2=IF - 2,JFM2=JF - 2                                          LUVFX184     3
          PARAMETER NREG=10,NREG2=NREG*2                                     L120583A     3
     *                                                                       ALLMAC       4
          REAL*4 KV,KH,NSQ,LSQ,LAM                                           F0530A       3
        . . KV022,KE,KVM                                                     F0723A       3
        . . LAMBAR                                                           L072801A     3
          LOGICAL FIXZS,FIXINT,DELTIS                                        F0430A       3
        . . FIXTS,FIXUV,VFIXUV,DMPGPI                                        DMPGPI       3
        . . OLDPI,DMPPII,UVFDIV,FORCIN                                       F1020A       3
        . . FTRTCH,VFIXTS,CONDEN                                             L081301A     3
          INTEGER PL,ZSFCHK,OJCOLF,REFBM                                     F0314B       3
        . . REFBF,FICHK,SAVSTR,SAVINC,SAVILO,SAVIHI,SAVJLO,SAVJHI            L120583A     5
          REAL*8 REFUA,REFUR                                                 F0417C       3
     *                                                                       ALLMAC       9
     *                                                                       F0417A       3
     * BEWARE:  THE ORDER OF VARIABLE IN THE COMMON BLOCKS IS NOT RANDOM!!!  F0417A       4
     *                                                                       F0417A       5
          COMMON/BASICO/BEGARK                                               L032302A     3
     *                                                                       L032302A     4
          COMMON/BASIC1/TAS(IFP1,JFP1,KF,2),USV(IF,JF,KF,2)                  ALLMAC      10
        . . U1(IFP1,JFP1),U2(IFP1,JFP1),U3(IFP1,JFP1),D4(IFP1,JFP1)          F292A        5
        . . U5(IFP1,JFP1),U6(IFP1,JFP1),D7(IFP1,JFP1),D8(IFP1,JFP1)          F292A        6
        . . D9(IFP1,JFP1),D10(IFP1,JFP1)                                     F292A        7
        . . TPP(IF,JF,2),TPL(IFP1,JFP1,2),TLL(IF,JF,2),ELL82(IFP1,JF)        F0417A       7
        . . EPP82(IF,JFP1),TSL82(IF,JF),TSP82(IF,JF),TFLUX(IF,JF)            F0825A       3
        . . EPL82(IFP1,JFP1)                                                 F0417A       9
        . . S(JFP1),C(JFP1),SBAR(JF),CBAR(JF)                                ALLMAC      13
        . . DPHI1(JFP1),DPBAR(JF),DPBAR1(JF),DLAM1(IFP1)                     F292A        9
        . . DLBAR(IF),DLBAR1(IF),ALFZ(IFP1,JFP1)                             ALLMAC      15
        . . CI(JFP1),CBAR1(JF),ZBARK(IF,JF,2),DELKZ(IF,JF,2)                 F0205A       6
        . . DZBRK1(IF,JF),ZBKIJK(IFP1,JFP1,2),ALFL(IF,JF),ALFP(IF,JF)        ALLMAC      10
        . . ZBOT(IF,JF)                                                      F0417A      11
        . . GLL(IF,JFP1),FSP(IF,JFP1),GSP(IFP1,JF),FSL(IFP1,JF)              ALLMAC      25
        . . GAS(IFP1,JFP1,2),FAS2(IF,JF)                                     ALLMAC      26
        . . UVSAV1(IF,JF,2),UVSAV2(IFP1,JFP1,2)                              ALLMAC      27
        . . UVSAV3(IFP1,JFP1,2),PISAV1(IF,JFP1,2),ZSFCHK                     F0204A       5
        . . TIME(P,NSQ(IF,JF,KF),ALFZI(IFP1,JFP1),IFNITR,FIA,FIERR           F0627B       3
        . . DOTCHK,FICHK,KVM,NORCVS(JF,KF),UMARN,FLXCHP                      F0825A       5
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  *                                                                              ALLMAC      29
       COMMON/BASIC2/Z,AV(IF,JF)                                                 ALLMAC      30
     . , KV(IF,JF,KFP1),KH(IFP1,JFP1,KF),RHO(IF,JF,KF)                           F0205A      12
     . , ZSUBTD(IF,JF),ZSUBTS(IF,JF)                                             F0417A      13
     . , PIAV(IF,JF,3),PIT3I(IF,JFP1,2),PISUR(IFP1,JFP1)                         F0417A      14
     . , AINV,CG,DEL,HL,LSQ,RHO0,G,BETAM,BETAV                                   ALLMAC      35
     . , F(IF,JF),LV,ZV,FS(IF,JF),DELT,LD,RARO                                   ALLMAC      36
     . , SURF(IFP1,JFP1),UR(IF,JF),F0                                            ALLMAC      37
     . , PHI(JF),LAM(IF),Z(IF,JF,4),UABVA(IF,JF,2)                               F256E        3
     . , FIXZS,ADBZS,FIXINT,ADBINT,SURFA                                         F0430A       6
     . , ZSUR(IF,JF),DZBKK2(IF,JF),FIXTS,THISLA,THISPA,THISSA                    F0417A      16
     . , CEVD(IF,JF,2,KFM1),FIXUV,THUVLA,THUVPA,THUVSA,THUVF                     F0205A      16
     . , ANS(IFP1,JFP1,KF,2)                                                     FIX192A      5
     . , KVOZZ(IF,JF),FBS(IF,JF),ALFZIJ(IF,JF)                                   FIX194B      5
     . , VFIXUV,THISLD,THISPD,THISSD,THUVLD,THUVPD,THUVSD                        FIX211A      7
     . , NSTEP,PC(60),IPC(3,40),GRADZB(IF,JF),DTMULT,DTMAX,DMPGPI                DMPGPI2      3
     . , KE,AUPWND,ASMZSM,ZSM(IF,JF),PI(IF,JF,KF),OLDPI                          PISWEEP1    13
     . , ZBPIF(IF,JF),DOFPII,DMPPII,NGRPPT,GSURF,NZSITR,XXXX2,ZSFERR             F0807A       5
     . , CJCOEF,OJCOEF,PEINF,ZSFLCR,ZSFA,UVFDIV                                  F0306A       5
     . , TTOT,TSUTOT,STOT,SSUTOT,REFBM,REFBF,REFBOT                              F0320A       5
     . , MINI(IF,JF),DELTTS,NPPAGE,MINEAN,MIOSCL                                 F0422B       3
  *                                                                              F0320A       6
       COMMON/BASIC3/REFBA(15),REFBR                                             F0417C       5
     . , FORCIN,FTMTCH,QRMULT,UMAX,VFIXTS,XXXX3                                  L071501A     5
     . , IRUN,LAMBAR(IFP1),PHIBAR(JFP1)                                          L0728 01A    5
     . , CONDEN,XLSPAC,XPSPAC                                                    L0727 03B    3
     . , CKM,ZCKM,FLUXIN(4),DINFL,DBOTBL,ZBOTHM(IF,JF)                           L0829 03B    3
     . , NREGON        ,SAVSTR(NREG ),SAVINC(NREG ),SAVPLO(NREG2)                L1220 03A    4
     . , SAVPHI(NREG2),SAVLLO(NREG2),SAVLHI(NREG2),SAVILO(2,NREG )               L122003A     5
     . , SAVIHI(2,NREG),SAVJLO(2,NREG),SAVJHI(2,NREG)                            L122003A     6
  *                                                                              L122703A     3
  *                                EDGE-I I-T OR S                               L122703A     4
       COMMON/BASIC4/EXTS1(IFP1,KFM1,2,2),EXTS2(JFP1,KFM1,2,2)                   L122703A     5
     . ,              EXUV1(IF   ,KFM1,2,2),EXUV2(JF   ,KFM1,2,2)                L122703A     6
     . ,              EXP11(IF   ,KFM1,2  ),EXP12(JF   ,KFM1,2  )                L122703A     7
  *                                                                              L032302A     6
       COMMON/BASICH/VAR1,VAR2,VAR3,VAR4,VAR5,VAR5B,ARY6(60),VAR7,VAR8           L040802A     3
     . ,  VAR9,VAR10,VAR11,VAR12,VAR13,VAR14,VAR15,VAR16,VAR17                   L032302A     8
     . , VAR18,VAR19,VAR20,VAR21,VAR22,VAR23,VAR24,VAR25                         L032302A     9
  *                                                                              L032302A    10
       COMMON/BASIC9/ENDMRK                                                      L032302A    11
  *                                                                              FIX184A      4
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86 ACTIVE LINE(S)   134 INACTIVE LINE(S)

DE LASE6

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SMS VERSION 5.27    LISTING OF DECK    C A S E 6                                              01/12/84          PAGE 1

*** SMS189 : DECK CASE6     IS EDITED FROM SPL       FILE
CREATED ON 03/31/83 AT 11:46:10          LAST UPDATED ON 06/15/83 AT 14:41:13 BY SMS VERSION 5.27
LANGUAGE:               USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L040483B  L040483C  L040583A  L061583A

         SUBROUTINE CASE6                                                         CASE6        1
   *                                                                              CASE6        2
   *     THIS ROUTINE MERGES OTS AND CLIMATOLOGY DATA FOR THE                     CASE6        3
   *          INITILIZATION                                                       CASE6        4
   *                                                                              CASE6        5
  $CALL ALLMAC                                                                    CASE6        6
   *                                                                              CASE6        7
         PARAMETER I20=20,NOTS=7,NCLIM=10,NFIELD=NOTS+NCLIM                       CASE6        8
         DIMENSION D63(63,63),T1A(I20),T2A(I20),Z1A(I20),Z2A(I20)                 CASE6        9
        * ,                    T1B(I20),T2B(I20),Z1B(I20),Z2B(I20)                CASE6       10
        * , DUMIJK(IF,JF,KF),DEPTH(NFIELD),DATA(I20),DEPTHS(NCLIM)                CASE6       11
         INTEGER TYPE,CATNO(NFIELD),CATNOS(NCLIM)                                 CASE6       12
         EQUIVALENCE (D63,LEVU),(DUMIJK,RH)                                       CASE6       13
         LOGICAL FIRST/T/                                                         CASE6       14
         DATA CATNO/"B10+","P14+","P15+","P16+","P17+","P18+","P19+"              CASE6       15
        * ,          "T  S","T040","T060","T080","T100","T150","T200"             CASE6       16
        * ,          "T300","T400","T500"/                                        CASE6       17
         DATA DEPTH/0.,60.96,121.92,182.88,243.84,304.80,365.76,0.,400.           CASE6       18
        * ,          600.,800.,1000.,1500.,2000.,3000.,4000.,5000./               CASE6       19
         DATA CATNOS/"S000","S005","S010","S020","S060","S100","S200"             CASE6       20
        * ,          "S300","S400","S500"/                                        CASE6       21
         DATA DEPTHS/0.,50.,100.,200.,600.,1000.,2000.,3000.,4000.,5000./         CASE6       22
         DATA HLH/200./                                                           CASE6       23
   *                                                                              CASE6       24
         IF (NFIELD .GT. KF*2) CALL STOPP                                         CASE6       25
        .(" ARRAY ANS TOO SMALL AS WORKING SPACE IN CASE6 6")                     CASE6       26
         IF (IF*JF*KFM1 .LT. 3969) CALL STOPP                                     CASE6       27
        .("LEVD IN CASES IS TOO SMALL TO HOLD A 63 BY 63 ARRAYS")                 CASE6       28
   *                                                                              CASE6       29
   * *** DO THE TEMPERATURE                                                       CASE6       30
   *                                                                              CASE6       31
         M=0                                                                      CASE6       32
     100 M=M+1                                                                    CASE6       33
         IF (M.GT.NFIELD) GO TO 150                                               CASE6       34
         IF (M.NE.1) GO TO 105                                                    CASE6       35
         READ (18) NCATNO,IS,IR,JS,JR                                             CASE6       36
         IF (NCATNT.NE.NOTS) CALL STOPP                                           CASE6       37
        .(" WRONG NUMBER OF OTS PARAMETER FIELDS IN CASE6 6")                     CASE6       38
     105 CONTINUE                                                                 CASE6       39
         IF (M.NE.NOTS+1) GO TO 110                                               CASE6       40
         READ (18) NPAR,IS,IR,JS,JR                                               CASE6       41
         IF (NPAR .NE. NCLIM*NCLIM) CALL STOPP                                    L040483B     3
        .(" WRONG NUMBER OF CLIM PARAMETER FIELDS IN CASE6 6")                    CASE6       43
     110 CONTINUE                                                                 CASE6       44
   *                                                                              CASE6       45
         IE=IR + IS - 1                                                           CASE6       46
         JE=JR + JS - 1                                                           CASE6       47
   *                                                                              CASE6       48
         READ (19) TYPE                                                           CASE6       49
         IF (TYPE .NE. CATNO(M)) CALL STOPP                                       CASE6       50
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```
      .(" WRONG OTS OR CLIM DATA FIELD IN CASE6 $")                CASE6      51
C                                                                  CASE6      52
      READ (10) ((D63(I,J),I=IS,IE),J=JS,JE)                       CASE6      53
C                                                                  CASE6      54
C     PUT INTO WORK ARRAY (ANS) BY INTERPOLATION                   CASE6      55
C                                                                  CASE6      56
      CALL COORDC(D63,63,PHIBAR,LAMBAR,ANS(1,1,N,1),IFP1,D1,D5,D7,D9 CASE6    57
     . , IF,JF,IFP1,JFP1,1,1,FIRST)                                CASE6      58
      IF (FIRST) FIRST=.FALSE.                                     CASE6      59
      GO TO 100                                                    CASE6      60
C                                                                  CASE6      61
C     ADD UP DIFFERENCES TO GET T, NOT DELTA T                     CASF6      62
C                                                                  CASE6      63
  150 CONTINUE                                                     CASE6      64
C                                                                  CASE6      65
      DO 160 N=2,7                                                 CASE6      66
      DO 160 J=2,JF                                                CASE6      67
      DO 160 I=2,IF                                                CASE6      68
      ANS(I,J,N,1)=ANS(I,J,N-1,1) + ANS(I,J,N,1)                   CASE6      69
  160 CONTINUE                                                     CASE6      70
C                                                                  CASE6      71
C *** FIND DATA AT THE CORRECT DEPTHS USING A SPLINE INTERPOLATION. CASE6     72
C       THIS PROCEDURE WILL BE VERY INEFFICIENT.  BUT IT DOESN'T   CASE6      73
C       MATTER SINCE WE ONLY DO IT ONCE PER RUN.                   CASE6      74
C                                                                  CASE6      75
C     THIS PROCEDURE INVOLVES THE BLENDING OF OTS AND CLIMATOLOGY. CASE6      76
C       THE OTS IS USED WITHOUT MODIFICATION.  THE CLIMATOLOGY IS  CASE6      77
C       CORRECTED.                                                 CASE6      78
C                                                                  CASE6      79
C     LOOP OVER MESH                                               CASE6      80
C                                                                  CASE6      81
      DO 280 I=2,IF                                                CASE6      82
      DO 280 J=2,JF                                                CASE6      83
C                                                                  CASE6      84
      DO 220 N=1,NFIELD                                            CASE6      85
  220 DATA(N)=ANS(I,J,N,1)                                         CASE6      86
C                                                                  CASE6      87
      CALL CUSPLN(DEPTH        ,DATA        ,NOTS ,Y1A,Y2A,Z1A,Z2A CASE6      88
     . ,         2,DATA(NOTS)  ,0)                                 CASE6      89
      CALL CUSPLN(DEPTH(NOTS+1),DATA(NOTS+1),NCLIM,Y1B,Y2B,Z1B,Z2B CASF6      90
     . ,         2,DATA(NFIELD),0)                                 CASE6      91
C                                                                  CASE6      92
      DO=DEPTH(NOTS)                                               L061503A    3
      DELTT=DATA(NOTS) - SPLINE(DO,DEPTH(NOTS+1),DATA(NOTS+1)      L040503A    3
     .                                      ,Y2B,NCLIM)            CASE6      95
      DELTP=Y1A(NOTS) - .1*(SPLINE(DO+5.,DEPTH(NOTS+1),DATA(NOTS+1) L040403C   3
     . , Y2B,NCLIM) -        SPLINE(DO-5.,DEPTH(NOTS+1),DATA(NOTS+1) CASF6    97
     . , Y2B,NCLIM))                                               CASE6      98
C                                                                  CASE6      99
      DO 260 K=2,KEM1                                              CASE6     100
      ZLL=DUMIJK(I,J,K)                                            CASE6     101
C                                                                  CASE6     102
      IF (ZLL - DO) 240,240,250                                    CASE6     103
  240 CONTINUE                                                     CASE6     104
      T63(I,J,K,1)=SPLINE(ZLL,DEPTH,DATA,Y2A,NOTS)                 CASF6     105
      GO TO 260                                                    CASE6     106
C                                                                  CASF6     107
  250 CONTINUE                                                     CASE6     108
```

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```
      EF=(1. + (ZEE-DO)/HCH) * EXP((DO-ZEE)/HCH)
      GE=(ZEE-DO)*EXP((DO-ZEE)/HCH)
*
      TSS(I,J,K,1)=SPLINE(ZEE,DEPTH(NOTS+1),DATA(NOTS+1),T2B,NCLIN)
     *            +DELTT*EF + DELTP*GE
*
  260 CONTINUE
*
  200 CONTINUE
*
*
* *** DO THE SALINITY
*
      N=0
  300 N=N+1
      IF (N.GT.NCLIN) GO TO 302
*
      READ (10) TYPE
      IF (TYPE.NE.CATNOS(N)) CALL STOPP
     *(' WRONG SALINITY FIELD IN CASE6 $')
*
      READ (10) ((D63(I,J),I=IS,IE),J=JS,JE)
*
      CALL COORDC(D63,63,PHIBAR,LAMBAR,ANS(1,1,N,1),IFP1,D1,D5,D7,D9
     * ,          IF,JF,IFP1,JFP1,1,1,FIRST)
      GO TO 300
*
  302 CONTINUE
*
      DO 315 I=2,IF
      DO 315 J=2,JF
*
      DO 305 N=1,NCLIN
  305 DATA(N)=ANS(I,J,N,1) - 35.
*
      CALL COSPLN(DEPTHS,DATA,NCLIN,Y1A,Y2A,Z1A,Z2A,2,DEPTHS(NCLIN)
     * ,          0)
*
      DO 310 K=2,KFM1
  310 TSS(I,J,K,2)=SPLINE(DUMIJK(I,J,K),DEPTHS,DATA,Y2A,NCLIN)
*
  315 CONTINUE
*
* *** APPLY NO FLUX LATERAL BOUNDARY CONDITIONS, EQN. 3.36 AND 3.37
*
      DO 340 K=2,KFM1
*
*
      DO 335 L=1,2
      DO 325 J=2,JF
      TSS(1,J,K,L)= TSS(3,J,K,L)
      TSS(IFP1,J,K,L)= TSS(IFM1,J,K,L)
  325 CONTINUE
*
      DO 330 I=1,IFP1
      TSS(I,1,K,L)= TSS(I,3,K,L)
      TSS(I,JFP1,K,L)= TSS(I,JFM1,K,L)
  330 CONTINUE
```

```
      335 CONTINUE                                             CASE6  167
*                                                              CASE6  168
      340 CONTINUE                                             CASE6  169
*                                                              CASE6  170
*         NOW APPLY NO FLUX CONDITION AT TOP AND BOTTOM        CASE6  171
*                                                              CASE6  172
          DO 350 L=1,2                                         CASE6  173
          DO 350 I=1,IFP1                                      CASE6  174
          DO 350 J=1,JFP1                                      CASE6  175
          TSS(I,J,1,L)=TSS(I,J,2,L)                            CASE6  176
          TSS(I,J,KF,L)=TSS(I,J,KFM1,L)                        CASE6  177
      350 CONTINUE                                             CASE6  178
*                                                              CASE6  179
*         SET INITIAL VELOCITIES TO ZERO                       CASE6  180
*                                                              CASE6  181
          USV=0.                                               CASE6  182
*                                                              CASE6  183
*         SET WIND AND SOLAR FLUX TO ZERO  (THEY CAN BE        CASE6  184
*           OVERRIDDEN BY THE FORCING)                         CASE6  185
*                                                              CASE6  186
          UASVA=0.                                             CASE6  187
          QR=0.                                                CASE6  188
*                                                              CASE6  189
*                                                              CASE6  190
          RETURN                                               CASE6  191
          END                                                  CASE6  192

          192 ACTIVE LINE(S)          5 INACTIVE LINE(S)

$E CASE7
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*** SMS109 : DECK CASE7     IS EDITED FROM SPL       FILE
CREATED ON 06/16/83 AT 11:56:13          LAST UPDATED ON 06/16/83 AT 11:56:13 BY SMS VERSION 5.27
LANGUAGE:            USER INFORMATION:

          SUBROUTINE CASE7
      *
      *   THIS ROUTINE MERGES EOTS AND CLIMATOLOGY DATA FOR THE
      *        INITILIZATION
      *
     $CALL ALLMAC
      *
          PARAMETER I20=25,NOTS=11,NCLIM=10,NFIELD=NOTS+NCLIM
          DIMENSION D63(63,63),T1A(I20),T2A(I20),Z1A(I20),Z2A(I20)
         . .                  T1B(I20),T2B(I20),Z1B(I20),Z2B(I20)
         . . DUMIJK(IF,JF,KF),DEPTH(NFIELD),DATA(I20),DEPTHS(NCLIM)
          INTEGER TYPE,CATNO(NFIELD),LATNOS(NCLIM)
          EQUIVALENCE (D63,CEVD),(DUMIJK,KM)
          LOGICAL FIRST/T/
          DATA CATNO/"AAIZ","AAQZ","AARZ","AASZ","AATZ","AAUZ","AAVZ"
         . .          "AAWZ","AAXZ","AAYZ","AAZZ"
         . .          "T  S","T040","T060","T080","T100","T150","T200"
         . .          "T300","T400","T500"/
          DATA DEPTH/0.,25.,50.,75.,100.,125.,150.,200.,250.,300.,400.
         . .        0.,400.
         . .        600.,800.,1000.,1500.,2000.,3000.,4000.,5000./
          DATA LATNOS/"S000","S005","S010","S020","S040","S100","S200"
         . .          "S300","S400","S500"/
          DATA DEPTHS/0.,50.,100.,200.,600.,1000.,2000.,3000.,4000.,5000./
          DATA MLM/200./
      *
          IF (NFIELD .GT. KF*2*2*IF*JF/(IFP1*JFP1)) CALL STOPP
         .(" ARRAY ANS TOO SMALL AS WORKING SPACE IN CASE7 $")
          IF (IF*JF*KFM1 .LT. 3969) CALL STOPP
         .("CEVD IN CASES IS TOO SMALL TO HOLD A 63 BY 63 ARRAY$")
      *
      * *** DO THE TEMPERATURE
      *
          N=0
      100 N=N+1
          IF (N.GT.NFIELD) GO TO 150
          IF (N.NE.1) GO TO 105
          READ (10) NCATNO,IS,IR,JS,JR
          IF (NCATNO.NE.NOTS) CALL STOPP
         .(" WRONG NUMBER OF EOTS PARAMETER FIELDS IN CASE7 $")
      105 CONTINUE
          IF (N.NE.NOTS+1) GO TO 110
          READ (10) NPAR,IS,IR,JS,JR
          IF (NPAR .NE. NCLIM+NCLIM) CALL STOPP
         .(" WRONG NUMBER OF CLIM PARAMETER FIELDS IN CASE7 $")
      110 CONTINUE
      *
          IE=IR + IS - 1
          JE=JR + JS - 1
      *
          READ (10) TYPE
          IF (TYPE .NE. CATNO(N)) CALL STOPP
```

```
     .(" WRONG EOTS OR CLIM DATA FIELD IN CASE7 ")
*
      READ (18) ((D63(I,J),I=IS,IE),J=JS,JE)
*
*     PUT INTO WORK ARRAY (ANS) BY INTERPOLATION
*
      CALL COORDC(D63,63,PHIBAR,LAMBAR,ANS(1,1,N,1),IFP1,D1,D5,D7,D9
     . , IF,JF,IFP1,JFP1,1,1,FIRST)
      IF (FIRST) FIRST=.FALSE.
      GO TO 100
*
*     ADD UP DIFFERENCES TO GET T, NOT DELTA T
*
  150 CONTINUE
*
      DO 160 N=2,NOTS
      DO 160 J=2,JF
      DO 160 I=2,IF
      ANS(I,J,N,1)=ANS(I,J,N-1,1) + ANS(I,J,N,1)
  160 CONTINUE
*
* *** FIND DATA AT THE CORRECT DEPTHS USING A SPLINE INTERPOLATION.
*       THIS PROCEDURE WILL BE VERY INEFFICIENT.  BUT IT DOESN'T
*       MATTER SINCE WE ONLY DO IT ONCE PER RUN.
*
*     THIS PROCEDURE INVOLVES THE BLENDING OF EOTS AND CLIMATOLOGY.
*       THE EOTS IS USED WITHOUT MODIFICATION,  THE CLIMATOLOGY IS
*       CORRECTED.
*
*     LOOP OVER MESH
*
      DO 280 I=2,IF
      DO 280 J=2,JF
*
      DO 220 N=1,NFIELD
  220 DATA(N)=ANS(I,J,N,1)
*
      CALL CUSPLN(DEPTH        ,DATA        ,NOTS ,Y1A,Y2A,Z1A,Z2A
     . ,          2,DATA(NOTS)  ,0)
      CALL CUSPLN(DEPTH(NOTS+1),DATA(NOTS+1),NCLIM,Y1B,Y2B,Z1B,Z2B
     . ,          2,DATA(NFIELD),0)
*
      DO=DEPTH(NOTS)
      DELTT=DATA(NOTS) - SPLINE(DO,DEPTH(NOTS+1),DATA(NOTS+1)
     .                                          ,Y2B,NCLIM)
      DELTP=Y1A(NOTS) - .1*(SPLINE(DO+5.,DEPTH(NOTS+1),DATA(NOTS+1)
     . , Y2B,NCLIM) -      SPLINE(DO-5.,DEPTH(NOTS+1),DATA(NOTS+1)
     . , Y2B,NCLIM))
*
      DO 260 K=2,KFM1
      ZEE=DUMIJK(I,J,K)
*
      IF (ZEE - DO) 240,240,250
  240 CONTINUE
      TBS(I,J,K,1)=SPLINE(ZEE,DEPTH,DATA,Y2A,NOTS)
      GO TO 260
*
  250 CONTINUE
```

```
      EF=(1. + (ZEE-DO)/HCH) * EXP((DO-ZEE)/HCH)                         CASE7 111
      GE=(ZEE-DO)*EXP((DO-ZEE)/HCH)                                      CASE7 112
*                                                                        CASE7 113
      TSS(I,J,K,1)=SPLINE(ZEE,DEPTH(NOTS+1),DATA(NOTS+1),Y2B,NCLIN)      CASE7 114
     *              *DELTT*EF + DELTP*GE                                 CASE7 115
*                                                                        CASE7 116
  260 CONTINUE                                                           CASE7 117
*                                                                        CASE7 118
  200 CONTINUE                                                           CASE7 119
*                                                                        CASE7 120
*                                                                        CASE7 121
* *** DO THE SALINITY                                                    CASE7 122
*                                                                        CASE7 123
      N=0                                                                CASE7 124
  300 N=N+1                                                              CASE7 125
      IF (N.GT.NCLIN) GO TO 302                                          CASE7 126
*                                                                        CASE7 127
      READ (18) TYPE                                                     CASE7 128
      IF (TYPE.NE.CATNOS(N)) CALL STOPP                                  CASE7 129
     *(' WRONG SALINITY FIELD IN CASE7 $')                               CASE7 130
*                                                                        CASE7 131
      READ (18) ((D63(I,J),I=IS,IE),J=JS,JE)                             CASE7 132
*                                                                        CASE7 133
      CALL COORDC(D63,63,PHIBAR,LAMBAR,ANS(1,1,N,1),IFP1,D1,D5,D7,D9     CASE7 134
     * ,          IF,JF,IFP1,JFP1,1,1,FIRST)                             CASE7 135
      GO TO 300                                                          CASE7 136
*                                                                        CASE7 137
  302 CONTINUE                                                           CASE7 138
*                                                                        CASE7 139
      DO 315 I=2,IF                                                      CASE7 140
      DO 315 J=2,JF                                                      CASE7 141
*                                                                        CASE7 142
      DO 305 N=1,NCLIN                                                   CASE7 143
  305 DATA(N)=ANS(I,J,N,1) - 35.                                         CASE7 144
*                                                                        CASE7 145
      CALL LUSPLN(DEPTHS,DATA,NCLIN,Y1A,Y2A,Z1A,Z2A,2,DEPTHS(NCLIN)      CASE7 146
     * ,          0)                                                     CASE7 147
*                                                                        CASE7 148
      DO 310 K=2,KFM1                                                    CASE7 149
  310 TSS(I,J,K,2)=SPLINE(DUMIJK(I,J,K),DEPTHS,DATA,Y2A,NCLIN)           CASE7 150
*                                                                        CASE7 151
  315 CONTINUE                                                           CASE7 152
*                                                                        CASE7 153
* *** APPLY NO FLUX LATERAL BOUNDARY CONDITIONS, EQN. 3.36 AND 3.37      CASE7 154
*                                                                        CASE7 155
      DO 340 K=2,KFM1                                                    CASE7 156
*                                                                        CASE7 157
*                                                                        CASE7 158
      DO 335 L=1,2                                                       CASE7 159
      DO 325 J=2,JF                                                      CASE7 160
      TSS(1,J,K,L)= TSS(3,J,K,L)                                         CASE7 161
      TSS(IFP1,J,K,L)= TSS(IFM1,J,K,L)                                   CASE7 162
  325 CONTINUE                                                           CASE7 163
*                                                                        CASE7 164
      DO 330 I=1,IFP1                                                    CASE7 165
      TSS(I,1,K,L)= TSS(I,3,K,L)                                         CASE7 166
      TSS(I,JFP1,K,L)= TSS(I,JFM1,K,L)                                   CASE7 167
  330 CONTINUE                                                           CASE7 168
```

```
    335 CONTINUE
*
    340 CONTINUE
*
*       NOW APPLY NO FLUX CONDITION AT TOP AND BOTTOM
*
        DO 350 L=1,2
        DO 350 I=1,IFP1
        DO 350 J=1,JFP1
        TSS(I,J,1,L)=TSS(I,J,2,L)
        TSS(I,J,KF,L)=TSS(I,J,KFM1,L)
    350 CONTINUE
*
*       SET INITIAL VELOCITIES TO ZERO
*
        USV=0.
*
*       SET WIND AND SOLAR FLUX TO ZERO  (THEY CAN BE
*         OVERRIDDEN BY THE FORCING)
*
        UABVA=0.
        QR=0.
*
*
        RETURN
        END
```

194 ACTIVE LINE(S)   0 INACTIVE LINE(S)

WE CASE8

```
*** SMS189 : DECK CASE0     IS EDITED FROM SPL      FILE
CREATED ON 12/20/83 AT 09:59:12          LAST UPDATED ON 12/27/83 AT 17:50:30 BY SMS VERSION 5.27
LANGUAGE:               USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L122783A

           SUBROUTINE CASE0                                            CASE0       1
      *                                                                CASE0       2
      *    THIS IS THE MASTER INITIALIZATION ROUTINE FOR A NESTED      CASE0       3
      *      RUN.  IT ACTS AS A MEMORY MANAGER FOR CASE0A, WHERE       CASE0       4
      *      THE ACTUAL INTERPOLATION IS PERFORMED.                    CASE0       5
      *                                                                CASE0       6
      $CALL ALLMAC                                                     CASE0       7
      *                                                                CASE0       8
           DIMENSION DUMIJK(IF,JF,KF),DUMK(IF,JF,KF),COUM(IF,JF,KFM1,2) CASE0      9
         . , OLBAR(1),OPBAR(1),OLAM(1),OPHI(1),OZBOT(IFP1,JFP1)        CASE0      10
           EQUIVALENCE (DUMIJK,KM),(DUMK,KV),(CEVD,COUM)               CASE0      11
         . , (OLBAR,D6),(OPBAR,D7),(OLAM,D8),(OPHI,D9),(OZBOT,D5)      CASE0      12
      *                                                                CASE0      13
           INTEGER OIRUN,ON,OSVSTR,OSVINC,ONI1,ONI2,ONJ1,ONJ2,OKF      CASE0      14
         . ,       OKFM1                                               CASE0      15
      *                                                                CASE0      16
           DATA LU/81/,LUS/82/                                         L122783A    3
      *                                                                CASE0      18
           READ (LU) OIRUN,ON                                          CASE0      19
           READ (LU) OSVSTR,OSVINC,OSVPLO,OSVPHI,OSVLLO,OSVLHI         CASE0      20
           IF (OSVLLO .GT. LAMBAR( 2)) GO TO 40                        CASE0      21
           IF (OSVLHI .LT. LAMBAR(IF)) GO TO 40                        CASE0      22
           IF (OSVPLO .GT. PHIBAR( 2)) GO TO 40                        CASE0      23
           IF (OSVPHI .LT. PHIBAR(JF)) GO TO 40                        CASE0      24
           GO TO 50                                                    CASE0      25
      *                                                                CASE0      26
        40 CONTINUE                                                    CASE0      27
           PRINT 901,OSVLLO,LAMBAR( 2)                                 CASE0      28
         . ,        OSVLHI,LAMBAR(IF)                                  CASE0      29
         . ,        OSVPLO,PHIBAR( 2)                                  CASE0      30
         . ,        OSVPHI,PHIBAR(JF)                                  CASE0      31
           CALL STOPP(" WRONG LIMITS ON NESTED RUN $")                 CASE0      32
       901 FORMAT (" OSVLLO= ",1PE12.5," MUST BE LESS    THAN ",1PE12.5,/ CASE0   33
         . ,       " OSVLHI= ",1PE12.5," MUST BE GREATER THAN ",1PE12.5,/ CASE0   34
         . ,       " OSVPLO= ",1PE12.5," MUST BE LESS    THAN ",1PE12.5,/ CASE0   35
         . ,       " OSVPHI= ",1PE12.5," MUST BE GREATER THAN ",1PE12.5)  CASE0   36
        50 CONTINUE                                                    CASE0      37
      *                                                                CASE0      38
           PRINT 902,ON,OIRUN,OSVSTR,OSVINC                            CASE0      39
       902 FORMAT (////," THIS IS SUBREGION ",I1," OF RUN ",I4         CASE0      40
         . , //," THIS DATA WAS STORED STARTING AT STEP ",I4,", AND"   CASE0      41
         . , " WAS SAVED EVERY ",I3," STEPS")                          CASE0      42
           READ (LU) ONI1,ONJ1,ONI2,ONJ2,OKF,DT                        CASE0      43
           READ (LU) (OLBAR(I),I=1,ONI1),(OPBAR(J),J=1,ONJ1)           CASE0      44
         . ,        ( OLAM(I),I=1,ONI2),( OPHI(J),J=1,ONJ2)            CASE0      45
           WRITE (LUS) ONI1,ONJ1,ONI2,ONJ2,OKF                         L122783A    5
           WRITE (LUS) (OLBAR(I),I=1,ONI1),(OPBAR(J),J=1,ONJ1)         L122783A    6
         . ,        ( OLAM(I),I=1,ONI2),( OPHI(J),J=1,ONJ2)            L122783A    7
           READ (LU) OFIXZS,OAUXZS,OZSFA,OZSFER,ONZSIT                 CASE0      46
         . ,        OFIXIN,OAUXIN,OFIA ,OFILRR,OIFNIT                  CASE0      47
```

```
          IF (ONI2*ONJ2 .GT. IFP1*JFP1) CALL STOPP                       CASE8     48
         .("  DS TOO SMALL IN CASE8")                                     CASE8     49
          READ (LU) ((O2BOT(I,J),I=1,ONI2),J=1,ONJ2)                      CASE8     50
    *                                                                     CASE8     51
    *     CHECK ON ARRAY WORK SPACE                                       CASE8     52
    *                                                                     CASE8     53
          OKFM1=OKF - 1                                                   CASE8     54
          IC=MAX(ONI1*ONJ1*OKFM1 , ONI2*ONJ2*OKFM1)                       CASE8     55
          IF (IC .GT. IF*JF*KFM1*2) CALL STOPP                            CASE8     56
         .("  WORK SPACE CEVO IS TOO SMALL IN CASE8")                     CASE8     57
    *                                                                     CASE8     58
    *     THE FOLLOWING MESS IS NECESSITATED BY ASC FORTRAN               CASE8     59
    *                                                                     CASE8     60
          CALL CASE8A(                                                    CASE8     61
         .   COUM,ONI1,ONJ1,OKFM1                                         CASE8     62
         . , COUM(1,1,1,2),ONI2,ONJ2,OKFM1                                CASE8     63
         . , OLBAR,ONI1                                                   CASE8     64
         . , OPBAR,ONJ1                                                   CASE8     65
         . , OLAM,ONI2                                                    CASE8     66
         . , OPHI,ONJ2                                                    CASE8     67
         . , ANS,ONI1,ONJ1,KF,2                                           CASE8     68
         . , D10,ONI1,ONJ1                                                CASE8     69
         . , ANS,ONI2,ONJ2,KF,2                                           CASE8     70
         . , DUMIJK,IF,JF,KF                                              CASE8     71
         . , DUMK,IF,JF,KF                                                CASE8     72
         . , TSS,IFP1,JFP1,KF,2                                           CASE8     73
         . , ZSUM,IF,JF                                                   CASE8     74
         . , USV,IF,JF,KF,2                                               CASE8     75
         . , LAMBAR,IFP1                                                  CASE8     76
         . , PHIBAR,JFP1                                                  CASE8     77
         . , LAM,IF                                                       CASE8     78
         . , PHI,JF     ,   LU,LJS)                                       L122783A   9
    *                                                                     CASE8     80
    *     APPLY NO FLUX CONDITIONS AT TOP AND BOTTOM                      CASE8     81
    *                                                                     CASE8     82
          DO 100 L=1,2                                                    CASE8     83
          DO 100 I=2,IF                                                   CASE8     84
          DO 100 J=2,JF                                                   CASE8     85
          TSS(I,J,1 ,L)=TSS(I,J,2   ,L)                                   CASE8     86
          TSS(I,J,KF,L)=TSS(I,J,KFM1,L)                                   CASE8     87
      100 CONTINUE                                                        CASE8     88
    *                                                                     CASE8     89
    *     (NOTE: USV( , ,1, ) WILL REALLY BE SET BY SURFACE FORCING       CASE8     90
    *                                                                     CASE8     91
          DO 110 L=1,2                                                    CASE8     92
          DO 110 I=2,IFM1                                                 CASE8     93
          DO 110 J=2,JFM1                                                 CASE8     94
          USV(I,J,1 ,L)=USV(I,J,2   ,L)                                   CASE8     95
          USV(I,J,KF,L)=USV(I,J,KFM1,L)                                   CASE8     96
      110 CONTINUE                                                        CASE8     97
    *                                                                     CASE8     98
    *     LATERAL BOUNDARY CONDITIONS WILL BE SET IN BOUNDB               CASE8     99
    *                                                                     CASE8    100
    *                                                                     CASE8    101
    *     THE WIND AND SOLAR FLUX CAN BE OVERRIDDEN BY THE FORCING        CASE8    102
    *                                                                     CASE8    103
          UASVA=0.                                                        CASE8    104
          UR=0.                                                           CASE8    105
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SMS VERSION 5.27    LISTING OF DECK    C A S E 8                                        01/12/84        PAGE 3
              *                                                                           CASE8        106
              *                                                                           CASE8        107
                     RETURN                                                               CASE8        108
                     END                                                                  CASE8        109

                     112 ACTIVE LINE(S)          2 INACTIVE LINE(S)

8E CASE8A
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SMS VERSION 5.27    LISTING OF DECK    C A S E B A                                              01/12/84          PAGE 1

*** SMS109 : DECK CASEBA   IS EDITED FROM SPL      FILE
CREATED ON 12/20/83 AT 09:59:14          LAST UPDATED ON 12/27/83 AT 17:58:40 BY SMS VERSION 5.27
LANGUAGE:                USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L1220838  L122783A

            SUBROUTINE CASEBAC                                                         CASEBA      1
           .   OZBIJK,ONI1,ONJ1,OKFM1                                                  CASEBA      2
           . , OZBK,ONI2,ONJ2,OKFM1                                                    CASEBA      3
           . , OLBAR,ONI1                                                              CASEBA      4
           . , OPBAR,ONJ1                                                              CASEBA      5
           . , OLAM,ONI2                                                               CASEBA      6
           . , OPHI,ONJ2                                                               CASEBA      7
           . , OTSS,ONI1,ONJ1,KF,LOTS                                                  CASEBA      8
           . , OZSUR,ONI1,ONJ1                                                         CASEBA      9
           . , OUSV,ONI2,ONJ2,KF,LOUV                                                  CASEBA     10
           . , ZBIJK,IF,JF,KF                                                          CASEBA     11
           . , ZBK,IF,JF,KF                                                            CASEBA     12
           . , TSS,IFP1,JFP1,KF,LTS                                                    CASEBA     13
           . , ZSUR,IF,JF                                                              CASEBA     14
           . , USV,IF,JF,KF,LUV                                                        CASEBA     15
           . , LAMBAR,IFP1                                                             CASEBA     16
           . , PHIBAR,JFP1                                                             CASEBA     17
           . , LAM,IF                                                                  CASEBA     18
           . , PHI,JF        , LU,LUS)                                                 L122783A    3
      *                                                                                CASEBA     20
      *                                                                                CASEBA     21
            INTEGER ONI1,ONJ1,OKFM1,OKFM2,ONI2,ONJ2                                    CASEBA     22
           . , ONI1M1,ONJ1M1,ONI2M1,ONJ2M1                                             CASEBA     23
            REAL LAMBAR,LAM                                                            CASEBA     24
      *                                                                                CASEBA     25
            DIMENSION OZBIJK(ONI1,ONJ1,OKFM1),OZBK(ONI2,ONJ2,OKFM1)                    CASEBA     26
           . , OLBAR(ONI1),OPBAR(ONJ1),OLAM(ONI2),OPHI(ONJ2)                           CASEBA     27
           . , OTSS(ONI1,ONJ1,KF,LOTS),OZSUR(ONI1,ONJ1)                                CASEBA     28
           . , OUSV(ONI2,ONJ2,KF,LOUV),ZBIJK(IF,JF,KF),ZBK(IF,JF,KF)                   CASEBA     29
           . , TSS(IFP1,JFP1,KF,LTS),ZSUR(IF,JF),USV(IF,JF,KF,LUV)                     CASEBA     30
           . , LAMBAR(IFP1),PHIBAR(JFP1),LAM(IF),PHI(JF)                               CASEBA     31
      *                                                                                CASEBA     32
            DIMENSION RES(20),A(4),B(4),IOF(4),JOF(4),K4(4),C4(4),ORC4(4)              CASEBA     33
           . , USE(4)                                                                  CASEBA     34
            DATA IOF/0,1,0,1/,JOF/0,0,1,1/                                             CASEBA     35
            LOGICAL ERROR                                                              CASEBA     36
      *                                                                                CASEBA     37
      *     WARNING OTSS AND OUSV ARE EXTERNALLY EQUIVALENCED                          CASEBA     38
      *                                                                                CASEBA     39
            ONI1M1=ONI1 - 1                                                            CASEBA     40
            ONI2M1=ONI2 - 1                                                            CASEBA     41
            ONJ1M1=ONJ1 - 1                                                            CASEBA     42
            ONJ2M1=ONJ2 - 1                                                            CASEBA     43
            OKFM2=OKFM1 - 1                                                            CASEBA     44
      *                                                                                CASEBA     45
      *     READ OLD DEPTH VALUES                                                      CASEBA     46
      *                                                                                CASEBA     47
            READ (LU) (((OZBIJK(I,J,K),I=1,ONI1),J=1,ONJ1),K=2,OKFM1)                 CASEBA     48
            READ (LU) (((OZBK  (I,J,K),I=1,ONI2),J=1,ONJ2),K=2,OKFM1)                 CASEBA     49
            WRITE (LUS) (((OZBIJK(I,J,K),I=1,ONI1),J=1,ONJ1),K=2,OKFM1)               L122783A    5
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```
      WRITE (LUS) (((OZBK  (I,J,K),I=1,ONI2),J=1,ONJ2),K=2,OKFM1)
*
*     READ OLD TES AND ZSUR
*
      READ (LU) ((((OTES(I,J,K,L),I=1,ONI1),J=1,ONJ1),K=1,KF)
     *, L=1,LOTS)
      READ (LU) ((OZSUR(I,J),I=1,ONI1),J=1,ONJ1)
*
*     DO THE INTERPOLATION
*
      DO 200 I=2,IF
*
      DO 110 IO=1,ONI1M1
      IF (LAMBAR(I).GT.OLBAR(IO) .AND. LAMBAR(I).LE.OLBAR(IO+1))
     *  GO TO 115
  110 CONTINUE
      PRINT 966,(OLBAR(IP),IP=1,ONI1M1)
  966 FORMAT (/," OLBAR= ",/,(10(2X,1PE11.4)))
      ENCODE(80,901,MES) I,LAMBAR(I)
  901 FORMAT (" LAMBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ..."
     * ,"CASE8A$")
      CALL STOPP(MES)
  115 CONTINUE
      AO=( LAMBAR(I)-OLBAR(IO) )  /  ( OLBAR(IO+1)-OLBAR(IO) )
      OMAO=1. - AO
      A(1)=OMAO
      A(2)=AO
      A(3)=OMAO
      A(4)=AO
*
*
      DO 190 J=2,JF
*
      DO 120 JO=1,ONJ1M1
      IF (PHIBAR(J).GE.OPBAR(JO) .AND. PHIBAR(J).LE.OPBAR(JO+1))
     *   GO TO 125
  120 CONTINUE
      PRINT 967,(OPBAR(JP),JP=1,ONJ1M1)
  967 FORMAT (/," OPBAR= ",/,(10(2X,1PE11.4)))
      ENCODE (80,902,MES) J,PHIBAR(J)
  902 FORMAT (" PHIBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ... "
     * , "CASE8A$")
      CALL STOPP (MES)
  125 CONTINUE
      BO=( PHIBAR(J)-OPBAR(JO) )  /  ( OPBAR(JO+1)-OPBAR(JO) )
      OMBO=1. - BO
      B(1)=OMBO
      B(2)=OMBO
      B(3)=BO
      B(4)=BO
*
*
*        (I,J+1)    1-------------------------------4  (I+1,J+1)
*                   |                               |
*                   |                               |
*                   |                               |
*                   |                               |
*                   |                               |
```

```
*        (I,J)     1-------------------------------2  (I+1,J)        CASE8A   107
*                                                                    CASE8A   108
*                                                                    CASE8A   109
*   X=X(1)* OMA* OMB + X(2)*   A* OMB + X(3)* OMA*   B + X(4)*   A*   B  CASE8A   110
*                                                                    CASE8A   111
*   X=X(1)*A(1)*B(1) + X(2)*A(2)*B(2) + X(3)*A(3)*B(3) + X(4)*A(4)*B(4)  CASE8A   112
*                                                                    CASE8A   113
*                                                                    CASE8A   114
* *** DO INTERPOLATION FOR ZSUR                                      CASE8A   115
*                                                                    CASE8A   116
      ZSUR(I,J)=0.                                                   CASE8A   117
      DO 127 N=1,4                                                   CASE8A   118
      ZSUR(I,J)=ZSUR(I,J) + OZSUR(I0+IOF(N),J0+JOF(N)) * A(N) * B(N) CASE8A   119
  127 CONTINUE                                                       CASE8A   120
*                                                                    CASE8A   121
* *** DO INTERPOLATION FOR T AND S                                   CASE8A   122
*                                                                    CASE8A   123
      KFM1=KF - 1                                                    CASE8A   124
      DO 180 K=2,KFM1                                                CASE8A   125
*                                                                    CASE8A   126
*     FIND K AND INTERPOLATION FACTORS FOR 4 CORNERS                 CASE8A   127
*                                                                    CASE8A   128
      DO 140 N=1,4                                                   CASE8A   129
*                                                                    CASE8A   130
      USE(N)=1.                                                      CASE8A   131
      DO 130 K0=2,OKFM2                                              CASE8A   132
      IF (ZBIJK(I,J,K).GE.OZBIJK(I0+IOF(N),J0+JOF(N),K0  ) .AND.     CASE8A   133
     *    ZBIJK(I,J,K).LE.OZBIJK(I0+IOF(N),J0+JOF(N),K0+1) ) GO TO 135  CASE8A   134
  130 CONTINUE                                                       CASE8A   135
      USE(N)=0.                                                      CASE8A   136
      K0=2                                                           CASE8A   137
  135 CONTINUE                                                       CASE8A   138
      K4(N)=K0                                                       CASE8A   139
      C4(N)=( ZBIJK(I,J,K) -      OZBIJK(I0+IOF(N),J0+JOF(N),K0) ) / CASE8A   140
     *      (OZBIJK(I0+IOF(N),J0+JOF(N),K0+1) -                      CASE8A   141
     *                            OZBIJK(I0+IOF(N),J0+JOF(N),K0) )   CASE8A   142
      OMC4(N)=1. - C4(N)                                             CASE8A   143
  140 CONTINUE                                                       CASE8A   144
*                                                                    CASE8A   145
*     DO INTERPOLATION                                               CASE8A   146
*                                                                    CASE8A   147
      IF (USE(1)*USE(2)*USE(3)*USE(4) .EQ. 0.) GO TO 155             CASE8A   148
*                                                                    CASE8A   149
      DO 150 L=1,2                                                   CASE8A   150
      TSS(I,J,K,L)=0.                                                CASE8A   151
      DO 150 N=1,4                                                   CASE8A   152
      TSS(I,J,K,L)=TSS(I,J,K,L) +                                    CASE8A   153
     * ( OMC4(N)*OTSS(I0+IOF(N),J0+JOF(N),K4(N)  ,L)                 CASE8A   154
     *  +  C4(N)*OTSS(I0+IOF(N),J0+JOF(N),K4(N)+1,L) ) * A(N) * B(N) CASE8A   155
     *                                             * USE(N)          CASE8A   156
  150 CONTINUE                                                       CASE8A   157
*                                                                    CASE8A   158
      FACT=0.                                                        CASE8A   159
      DO 152 N=1,4                                                   CASE8A   160
  152 FACT=FACT + A(N) * B(N) * USE(N)                               CASE8A   161
*                                                                    CASE8A   162
      IF (FACT .NE. 0.) GO TO 154                                    CASE8A   163
      LOGICAL DEBUG/.FALSE./                                         CASE8A   164
```

```
      IF (.NOT.DEBUG) GO TO 155
      PRINT 961,(A(NP),B(NP),USE(NP),NP=1,4)
  961 FORMAT ('    A, B, AND USE:',/
     . ,(3(2X,1PE11.4)))
      PRINT 964,PHIBAR(J),OPBAR(J0),OPBAR(J0+1)
      PRINT 965,LAMBAR(I),OLBAR(I0),OLBAR(I0+1)
  964 FORMAT (' PHI, OPHI, OPHI+1 =',3(2X,1PE11.4))
  965 FORMAT (' LAM, OLAM, OLAM+1 =',3(2X,1PE11.4))
      PRINT 962,I,J,K,ZBIJK(I,J,K)
  962 FORMAT (/,' ZBIJK(' , I2 , ',' , I2 , ',' , I2 , ')=',1PE11.4)
      DO 160 NP=1,4
      PRINT 963,NP,(OZBIJK(I0+IOF(NP),J0+JOF(NP),KK),KK=2,OKFM1)
  963 FORMAT (//,'  N= ',I2,'     OZBIJK=',/
     . , (7(2X,1PE11.4)))
  160 CONTINUE
      CALL STOPP('  FACT = 0 IN CASE8A $')
  154 CONTINUE
*
      FACT=1. / FACT
      DO 153 L=1,2
  153 TOS(I,J,K,L)=TOS(I,J,K,L) * FACT
*
      GO TO 150
*
  155 CONTINUE
      DO 156 L=1,2
      CALL CASE8B(TOS(I,J,K,L),ZBIJK(I,J,K),OZBIJK,ONI1,ONJ1,OKFM1
     . , OTOS(1,1,1,L),ONI1,ONJ1,KF,IOF,JOF,I0,J0,2,OKFM1,A,B
     . , ERROR)
      IF (ERROR) GO TO 157
  156 CONTINUE
      GO TO 150
  157 CONTINUE
      PRINT 940,I,J,K,ZBIJK(I,J,K)
      DO 999 N=1,4
      PRINT 941,(OZBIJK(I0+IOF(N),J0+JOF(N),KP),KP=2,OKFM1)
  999 CONTINUE
*
  940 FORMAT ('  ZBIJK(', I2 , ',' , I2 , ',' , I2 ,')= ',1PE11.4)
  941 FORMAT (/,'   OZBIJK=',5(3X,1PE11.4)
     . , /,    ('           ',5(3X,1PE11.4)))
      CALL STOPP(' POINT TOO DEEP IN CASE8A$')
*
  150 CONTINUE
*
  180 CONTINUE
*
  190 CONTINUE
*
  200 CONTINUE
*
*
*     READ OLD USV
*
      READ (LU) ((((OUSV(I,J,K,L),I=1,ONI2),J=1,ONJ2),K=1,KF)
     . , L=1,LMS)
*
*     DO THE INTERPOLATION
```

```
      *
            IFM1=IF - 1
            DO 700 I=2,IFM1
      *
            DO 610 IO=1,ONI2M1
            IF (LAM(I).GT.OLAM(IO) .AND. LAM(I).LE.OLAM(IO+1))
           .  GO TO 615
        610 CONTINUE
            ENCODE(80,911,MES) I,LAM(I)
        911 FORMAT (' LAM(',I2,')=',1PE10.3,' NOT ON OLD MESH ...'
           . ,'CASE8A6')
            CALL STOPP(MES)
        615 CONTINUE
            A0=( LAM(I)-OLAM(IO) )  /  ( OLAM(IO+1)-OLAM(IO) )
            OMA0=1. - A0
            A(1)=OMA0
            A(2)=A0
            A(3)=OMA0
            A(4)=A0
      *
      *
            JFM1=JF - 1
            DO 690 J=2,JFM1
      *
            DO 620 JO=1,ONJ2M1
            IF (PHI(J).GE.OPHI(JO) .AND. PHI(J).LE.OPHI(JO+1))
           .  GO TO 625
        620 CONTINUE
            ENCODE (80,912,MES) J,PHI(J)
        912 FORMAT (' PHI(',I2,')=',1PE10.3,' NOT ON OLD MESH ... '
           . , 'CASE8A7')
            CALL STOPP (MES)
        625 CONTINUE
            B0=( PHI(J)-OPHI(JO) )  /  ( OPHI(JO+1)-OPHI(JO) )
            OMB0=1. - B0
            B(1)=OMB0
            B(2)=OMB0
            B(3)=B0
            B(4)=B0
      *
      *
            DO 680 K=2,KFM1
      *
      *     FIND K AND INTERPOLATION FACTORS FOR 4 CORNERS
      *
            DO 640 N=1,4
      *
            USE(N)=1.
            DO 630 KO=2,OKFM2
            IF (ZBK(I,J,K).GE.OZBK(IO+IOF(N),JO+JOF(N),KO  ) .AND.
           .    ZBK(I,J,K).LE.OZBK(IO+IOF(N),JO+JOF(N),KO+1) ) GO TO 635
        630 CONTINUE
            USE(N)=0.
            KO=2
        635 CONTINUE
            K4(N)=KO
            C4(N)=( ZBK(I,J,K) -      OZBK(IO+IOF(N),JO+JOF(N),KO) ) /
           .      (OZBK(IO+IOF(N),JO+JOF(N),KO+1) -
```

```
       .                                  OZBK(IO+IOF(N),JO+JOF(N),KO) )    CASE8A    281
        OMLG(N)=1. - LG(N)                                                 CASE8A    282
  640 CONTINUE                                                             CASE8A    283
*                                                                          CASE8A    284
*       DO INTERPOLATION                                                   CASE8A    285
*                                                                          CASE8A    286
        IF (USE(1)+USE(2)+USE(3)+USE(4) .EQ. 0.) GO TO 655                 CASE8A    287
*                                                                          CASE8A    288
        DO 650 L=1,2                                                       CASE8A    289
        USV(I,J,K,L)=0.                                                    CASE8A    290
        DO 650 N=1,4                                                       CASE8A    291
        USV(I,J,K,L)=USV(I,J,K,L) +                                        CASE8A    292
       . ( OMLG(N)*OUSV(IO+IOF(N),JO+JOF(N),KG(N)  ,L)                     CASE8A    293
       .  +   LG(N)*OUSV(IO+IOF(N),JO+JOF(N),KG(N)+1,L) ) * A(N) * B(N)    CASE8A    294
       .                                                   * USE(N)        CASE8A    295
  650 CONTINUE                                                             CASE8A    296
*                                                                          CASE8A    297
        FACT=0.                                                            CASE8A    298
        DO 652 N=1,4                                                       CASE8A    299
  652 FACT=FACT + A(N) * B(N) * USE(N)                                     CASE8A    300
*                                                                          L1220838    3
        IF (FACT .EQ. 0.) GO TO 655                                        L1220838    4
*                                                                          CASE8A    301
        FACT=1. / FACT                                                     CASE8A    302
        DO 653 L=1,2                                                       CASE8A    303
  653 USV(I,J,K,L)=USV(I,J,K,L) * FACT                                     CASE8A    304
*                                                                          CASE8A    305
        GO TO 658                                                          CASE8A    306
*                                                                          CASE8A    307
  655 CONTINUE                                                             CASE8A    308
        DO 656 L=1,2                                                       CASE8A    309
        USV(I,J,K,L)=0.                                                    CASE8A    310
  656 CONTINUE                                                             CASE8A    311
*                                                                          CASE8A    312
  658 CONTINUE                                                             CASE8A    313
*                                                                          CASE8A    314
  660 CONTINUE                                                             CASE8A    315
*                                                                          CASE8A    316
  690 CONTINUE                                                             CASE8A    317
*                                                                          CASE8A    318
  700 CONTINUE                                                             CASE8A    319
*                                                                          CASE8A    320
*                                                                          CASE8A    321
        RETURN                                                             CASE8A    322
        END                                                                CASE8A    323

              327 ACTIVE LINE(S)            1 INACTIVE LINE(S)

6E CASE8B
```

```
*** SMS109 : DECK CASE08   IS EDITED FROM SPL      FILE
CREATED ON 12/12/83 AT 17:15:13          LAST UPDATED ON 12/20/83 AT 09:59:16 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L121303A  L122003A

          SUBROUTINE CASE08(X,DEPTHI,Z,IZ,JZ,KZ,Y,IY,JY,KY,IOF,JOF          CASE08      1
         * , I0,J0,K1,K2,A,B,ERROR)                                          CASE08      2
     *                                                                       CASE08      3
     *    THIS SUBROUTINE DOES A SPLINE EXTRAPOLATION FOR POINTS OUT OF      CASE08      4
     *      RANGE                                                            CASE08      5
     *                                                                       CASE08      6
          PARAMETER P=20                                                     CASE08      7
          LOGICAL ERROR                                                      CASE08      8
     *                                                                       CASE08      9
          DIMENSION Z(IZ,JZ,KZ),Y(IY,JY,KY),IOF(4),JOF(4)                    CASE08     10
         * , A(4),B(4)                                                       L121303A    3
     *                                                                       CASE08     11
          DIMENSION Y1(P),Y2(P),Z1(P),Z2(P),DEPTH(P),DATA(P),USE(4)          CASE08     12
         * , X4(4)                                                           CASE08     13
     *                                                                       CASE08     14
          NK=K2 - K1 + 1                                                     CASE08     15
          IF (NK .GT. P) CALL STOPP(" PARAMETER TOO SMALL IN CASE08")        CASE08     16
          KOF=K1 - 1                                                         CASE08     17
     *                                                                       CASE08     18
          DO 30 N=1,4                                                        CASE08     19
     *                                                                       CASE08     20
          DO 20 K=K1,K2                                                      CASE08     21
          KK=K - KOF                                                         CASE08     22
          DEPTH(KK)=Z(I0+IOF(N),J0+JOF(N),K)                                 CASE08     23
          DATA (KK)=Y(I0+IOF(N),J0+JOF(N),K)                                 CASE08     24
       20 CONTINUE                                                           CASE08     25
     *                                                                       CASE08     26
          CALL CUSPLN(DEPTH,DATA,NK,Y1,Y2,Z1,Z2,1,DEPTH(NK),0)               CASE08     27
     *                                                                       CASE08     28
          X4(N)=SPLINE(DEPTHI,DEPTH,DATA,Y2,NK)                              CASE08     29
     *                                                                       CASE08     30
          USE(N)=1.                                                          CASE08     31
          IF (DEPTHI .GT. 2*DEPTH(NK)) USE(N)=EXP(-DEPTHI/DEPTH(NK))         L122003A    3
     *                                                                       CASE08     33
       30 CONTINUE                                                           CASE08     34
     *                                                                       CASE08     35
          ERROR=.FALSE.                                                      CASE08     36
          IF (USE(1)+USE(2)+USE(3)+USE(4) .NE. 0.) GO TO 50                  CASE08     37
          ERROR=.TRUE.                                                       CASE08     38
          RETURN                                                             CASE08     39
     *                                                                       CASE08     40
       50 CONTINUE                                                           CASE08     41
          X    =0.                                                           CASE08     42
          FACT=0.                                                            CASE08     43
          DO 60 N=1,4                                                        CASE08     44
          X    =X     + X4(N) * A(N) * B(N) * USE(N)                         CASE08     45
          FACT=FACT +         A(N) * B(N) * USE(N)                           CASE08     46
       60 CONTINUE                                                           CASE08     47
     *                                                                       CASE08     48
          X=X / FACT                                                         CASE08     49
```

```
SMS VERSION 5.27    LISTING OF DECK    C A S E 0 8                                    03/12/84        PAGE 2

          *                                                                             CASE08        50
          *                                                                             CASE08        51
               RETURN                                                                   CASE08        52
               END                                                                      CASE08        53

               54 ACTIVE LINE(S)           1 INACTIVE LINE(S)

6E ENDND
```

```
*** SMS109 : DECK EXBND     IS EDITED FROM SPL       FILE
CREATED ON 12/27/83 AT 17:58:41           LAST UPDATED ON 01/04/84 AT 13:39:42 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L0104A

            SUBROUTINE EXBND
      *
      *     THIS ROUTINE READS BOUNDARY DATA WRITTEN BY THE COARSE RUN,
      *      AND FINDS THE  VALUES ON THE BOUNDARY FOR USE IN THE
      *      APPLICATION OF THE BOUNDARY CONDITIONS.   IT ACTS AS A
      *      MEMORY MANAGER FOR EXBNDA, WHERE THE ACTION OCCURS.
      *
      $CALL ALLMAC
      *
            DIMENSION DUMIJK(IF,JF,KF),DUMK(IF,JF,KF),CDUM(IF,JF,KFM1,2)
           . , OLBAR(1),OPBAR(1),OLAM(1),OPHI(1)
            EQUIVALENCE (DUMIJK,KN),(DUMK,KV),(CEVD,CDUM)
           . , (OLBAR,D6),(OPBAR,D7),(OLAM,D8),(OPHI,D9)
      *
            INTEGER ONI1,ONI2,ONJ1,ONJ2,OKF,OKFM1
      *
            DATA LU/01/,LUS/02/
      *
            REWIND LUS
            READ (LUS) ONI1,ONJ1,ONI2,ONJ2,OKF
            READ (LUS) (OLBAR(I),I=1,ONI1),(OPBAR(J),J=1,ONJ1)
           . ,           ( OLAM(I),I=1,ONI2),( OPHI(J),J=1,ONJ2)
      *
      *     CHECK ON ARRAY WORK SPACE
      *
            OKFM1=OKF - 1
            IC=MAX(ONI1*ONJ1*OKFM1 , ONI2*ONJ2*OKFM1)
            IF (IC .GT. IF*JF*KFM1*2) CALL STOPP
           .(" WORK SPACE CEVD IS TOO SMALL IN EXBNDS")
      *
      *     THE FOLLOWING MESS IS NECESSITATED BY ASC FORTRAN
      *
            CALL EXBNDA(
           .   CDUM,ONI1,ONJ1,OKFM1
           . , CDUM(1,1,1,2),ONI2,ONJ2,OKFM1
           . , OLBAR,ONI1    ,    OPBAR,ONJ1
           . , OLAM,ONI2    ,    OPHI,ONJ2
           . , ANS,ONI1,ONJ1,KF,2
           . , ANS,ONI2,ONJ2,KF,2
           . , ANS,ONI1,ONJ1,KF
           . , DUMIJK,IF,JF,KF
           . , DUMK,IF,JF,KF
           . , EXTS1,IFP1,KFM1
           . , EXTS2,JFP1,KFM1
           . , EXUV1,IF,KFM1
           . , EXUV2,JF,KFM1
           . , EXPI1,IF,KFM1
           . , EXPI2,JF,KFM1
           . , LAMBAR,IFP1    ,    PHIBAR,JFP1
           . , LAM,IF    ,    PHI,JF    ,    LU,LUS)
```

```
SAS VERSION 5.27    LISTING OF DECK    E X B N D                                        01/12/84        PAGE 2

       50    *                                                                           EXBND       51
       51    *                                                                           EXBND       52
       52          RETURN                                                                EXBND       53
       53          END                                                                   EXBND       54

             54 ACTIVE LINE(S)          1 INACTIVE LINE(S)

#E EXBNDA
```

```
*** SMS109 : DECK EXBNDA   IS EDITED FROM SPL      FILE
CREATED ON 12/27/83 AT 17:58:43         LAST UPDATED ON 01/05/84 AT 13:32:20 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L0105O4A  L0105O4B

            SUBROUTINE EXBNDA(
           .   OZBIJK,ONI1,ONJ1,OKFM1
           . , OZBK,ONI2,ONJ2,OKFM1
           . , OLBAR,ONI1    ,    OPBAR,ONJ1
           . , OLAM,ONI2    ,    OPHI,ONJ2
           . , OTSS,ONI1,ONJ1,KF,LOTS
           . , OUSV,ONI2,ONJ2,KF,LOUV
           . , OPI,ONI1,ONJ1,KF
           . , ZBIJK,IF,JF,KF
           . , ZBK,IF,JF,KF
           . , EXTS1,IFP1,KFM1
           . , EXTS2,JFP1,KFM1
           . , EXUV1,IF,KFM1
           . , EXUV2,JF,KFM1
           . , EXPI1,IF,KFM1
           . , EXPI2,JF,KFM1
           . , LAMBAR,IFP1    ,    PHIBAR,JFP1
           . , LAM,IF    ,    PHI,JF    ,    LU,LUS)
*
*
            INTEGER ONI1,ONJ1,OKFM1,OKFM2,ONI2,ONJ2
           . , ONI1M1,ONJ1M1,ONI2M1,ONJ2M1
            REAL LAMBAR,LAM
*
            DIMENSION OZBIJK(ONI1,ONJ1,OKFM1),OZBK(ONI2,ONJ2,OKFM1)
           . , OLBAR(ONI1),OPBAR(ONJ1),OLAM(ONI2),OPHI(ONJ2)
           . , OTSS(ONI1,ONJ1,KF,LOTS),OPI(ONI1,ONJ1,KF)
           . , OUSV(ONI2,ONJ2,KF,LOUV),ZBIJK(IF,JF,KF),ZBK(IF,JF,KF)
           . , EXTS1(IFP1,KFM1,2,2),EXTS2(JFP1,KFM1,2,2)
           . , EXUV1(IF,KFM1,2,2),EXUV2(JF,KFM1,2,2)
           . , EXPI1(IF,KFM1,2),EXPI2(JF,KFM1,2)
           . , LAMBAR(IFP1),PHIBAR(JFP1),LAM(IF),PHI(JF)
           . , ANSR(2)
*
            DIMENSION MES(20),A(4),B(4),IOF(4),JOF(4),K4(4),C4(4),OMC4(4)
           . , USE(4)
            DATA IOF/0,1,0,1/,JOF/0,0,1,1/,TRASH/77F000000/
            LOGICAL ERROR
*
*           WARNING OTSS AND OUSV ARE EXTERNALLY EQUIVALENCED
*
            ONI1M1=ONI1 - 1
            ONI2M1=ONI2 - 1
            ONJ1M1=ONJ1 - 1
            ONJ2M1=ONJ2 - 1
            OKFM2=OKFM1 - 1
*
*           READ OLD DEPTH VALUES
*
            READ (LUS) (((OZBIJK(I,J,K),I=1,ONI1),J=1,ONJ1),K=2,OKFM1)
```

```
      READ (LUS) (((OZBK  (I,J,K),I=1,ONI2),J=1,ONJ2),K=2,OKFM1)
*
*     READ OLD TBS
*
      OTBS=TRASH
      CALL RWBND(OTBS,ONI1,ONJ1,KF,LOTS,1,ONI1,1,ONJ1,1,KF,1,LOTS
     . , LU,.TRUE.)
*
*     DO THE INTERPOLATION
*
      DO 200 I=2,IF
*
      DO 110 IO=1,ONI1M1
      IF (LAMBAR(I).GT.OLBAR(IO) .AND. LAMBAR(I).LE.OLBAR(IO+1))
     .  GO TO 115
  110 CONTINUE
      PRINT 966,(OLBAR(IP),IP=1,ONI1M1)
  966 FORMAT (/,"  OLBAR= ",/,(10(2X,1PE11.4)))
      ENCODE(80,901,MES) I,LAMBAR(I)
  901 FORMAT (" LAMBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ..."
     . ,"EXBNDAS")
      CALL STOPP(MES)
  115 CONTINUE
      IF (LAMBAR(I) .EQ. OLBAR(ONI1M1)) IO=IO + 1
      AO=( LAMBAR(I)-OLBAR(IO) )  /  ( OLBAR(IO+1)-OLBAR(IO) )
      OMAO=1. - AO
      A(1)=OMAO
      A(2)=AO
      A(3)=OMAO
      A(4)=AO
*
*
      IF (I.NE.2 .AND. I.NE.IF) GO TO 116
      JI=1
      GO TO 117
  116 CONTINUE
      JI=JF - 2
  117 CONTINUE
      DO 190 J=2,JF,JI
*
      DO 120 JO=1,ONJ1M1
      IF (PHIBAR(J).GT.OPBAR(JO) .AND. PHIBAR(J).LE.OPBAR(JO+1))
     .   GO TO 125
  120 CONTINUE
      PRINT 967,(OPBAR(JP),JP=1,ONJ1M1)
  967 FORMAT (/,"  OPBAR= ",/,(10(2X,1PE11.4)))
      ENCODE (80,902,MES) J,PHIBAR(J)
  902 FORMAT (" PHIBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ... "
     . , "EXBNDAS")
      CALL STOPP (MES)
  125 CONTINUE
      IF (PHIBAR(J) .EQ. OPBAR(ONJ1M1)) JO=JO + 1
      BO=( PHIBAR(J)-OPBAR(JO) )  /  ( OPBAR(JO+1)-OPBAR(JO) )
      OMBO=1. - BO
      B(1)=OMBO
      B(2)=OMBO
      B(3)=BO
      B(4)=BO
```

```
*
*
*       (I,J+1)     3-------------------------------4  (I+1,J+1)
*                   !                               !
*                   !                               !
*                   !                               !
*                   !                               !
*       (I,J)       1-------------------------------2  (I+1,J)
*
*
*    X=X(1)* OMA* OMB + X(2)*   A* OMB + X(3)* OMA*   B + X(4)*   A*   B
*
*    X=X(1)*A(1)*B(1) + X(2)*A(2)*B(2) + X(3)*A(3)*B(3) + X(4)*A(4)*B(4)
*
*
* *** DO INTERPOLATION FOR T AND S
*
      KFM1=KF - 1
      DO 100 K=2,KFM1
*
*     FIND K AND INTERPOLATION FACTORS FOR 4 CORNERS
*
      DO 140 N=1,4
*
      USE(N)=1.
      DO 130 KO=2,OKFM2
      IF (ZBIJK(I,J,K).GE.OZBIJK(IO+IOF(N),JO+JOF(N),KO  ) .AND.
     *    ZBIJK(I,J,K).LE.OZBIJK(IO+IOF(N),JO+JOF(N),KO+1) ) GO TO 135
  130 CONTINUE
      USE(N)=0.
      KO=2
  135 CONTINUE
      K4(N)=KO
      C4(N)=( ZBIJK(I,J,K) -      OZBIJK(IO+IOF(N),JO+JOF(N),KO) ) /
     *       (OZBIJK(IO+IOF(N),JO+JOF(N),KO+1) -
     *                            OZBIJK(IO+IOF(N),JO+JOF(N),KO) )
      OMC4(N)=1. - C4(N)
  140 CONTINUE
*
*     DO INTERPOLATION
*
      IF (USE(1)+USE(2)+USE(3)+USE(4) .EQ. 0.) GO TO 155
*
      DO 150 L=1,2
      ANSR(L)=0.
      DO 150 N=1,4
      ANSR(L)=ANSR(L) +
     * ( OMC4(N)*OTSS(IO+IOF(N),JO+JOF(N),K4(N)  ,L)
     *  +  C4(N)*OTSS(IO+IOF(N),JO+JOF(N),K4(N)+1,L) ) * A(N) * B(N)
     *                                                  * USE(N)
  150 CONTINUE
*
      FACT=0.
      DO 152 N=1,4
  152 FACT=FACT + A(N) * B(N) * USE(N)
*
      IF (FACT .NE. 0.) GO TO 154
```

```
      LOGICAL DEBUG/.FALSE./
      IF (.NOT.DEBUG) GO TO 155
      PRINT 961,(A(NP),B(NP),USE(NP),NP=1,4)
  961 FORMAT ('     A, B, AND USE:',/
     . ,(3(2X,1PE11.4)))
      PRINT 964,PHIBAR(J),OPBAR(J0),OPBAR(J0+1)
      PRINT 965,LAMBAR(I),OLBAR(I0),OLBAR(I0+1)
  964 FORMAT (' PHI, OPHI, OPHI+1 =',3(2X,1PE11.4))
  965 FORMAT (' LAM, OLAM, OLAM+1 =',3(2X,1PE11.4))
      PRINT 962,I,J,K,ZBIJK(I,J,K)
  962 FORMAT (/,' ZBIJK(' , I2 , ',' , I2 , ',' , I2 , ')=',1PE11.4)
      DO 160 NP=1,4
      PRINT 963,NP,(OZBIJK(I0+IOF(NP),J0+JOF(NP),KK),KK=2,OKFM1)
  963 FORMAT (//,'  N= ',I2,'     OZBIJK=',/
     . , (7(2X,1PE11.4)))
  160 CONTINUE
      CALL STOPP('  FACT = 0 IN EXBNDA B')
  154 CONTINUE
*
      FACT=1. / FACT
      DO 153 L=1,2
  153 ANSR(L)=ANSR(L) * FACT
*
      GO TO 150
*
  155 CONTINUE
      DO 156 L=1,2
      CALL CASEBB(ANSR(L),ZBIJK(I,J,K),OZBIJK,ONI1,ONJ1,OKFM1
     . , OTBS(1,1,1,L),ONI1,ONJ1,KF,IOF,JOF,I0,J0,2,OKFM1,A,B
     . , ERROR)
      IF (ERROR) GO TO 157
  156 CONTINUE
      GO TO 150
  157 CONTINUE
      PRINT 940,I,J,K,ZBIJK(I,J,K)
      DO 999 N=1,4
      PRINT 941,(OZBIJK(I0+IOF(N),J0+JOF(N),KP),KP=2,OKFM1)
  999 CONTINUE
*
  940 FORMAT ('  ZBIJK(', I2 , ',' , I2 , ',' , I2 ,')= ',1PE11.4)
  941 FORMAT (/,'    OZBIJK=',5(3X,1PE11.4)
     . , /,     ('              ',5(3X,1PE11.4)))
      CALL STOPP(' POINT TOO DEEP IN EXBNDAB')
*
  150 CONTINUE
*
      DO 170 L=1,2
      IF (I.NE.2) GO TO 162
*
*     LEFT EDGE
*
      EXTS2(J,K,1,L)=ANSR(L)
      GO TO 170
  162 IF (I.EQ.IF) GO TO 168
      IF (J.NE.2) GO TO 164
*
*     BOTTOM EDGE
*
```

```
      EXTS1(I,K,1,L)=ANSR(L)                                          EXBNDA   223
      GO TO 170                                                       EXBNDA   224
*                                                                     EXBNDA   225
*     TOP EDGE                                                        EXBNDA   226
*                                                                     EXBNDA   227
  164 EXTS1(I,K,2,L)=ANSR(L)                                          EXBNDA   228
      GO TO 170                                                       EXBNDA   229
*                                                                     EXBNDA   230
*     RIGHT EDGE                                                      EXBNDA   231
*                                                                     EXBNDA   232
  168 EXTS2(J,K,2,L)=ANSR(L)                                          EXBNDA   233
*                                                                     EXBNDA   234
  170 CONTINUE                                                        EXBNDA   235
*                                                                     EXBNDA   236
  180 CONTINUE                                                        EXBNDA   237
*                                                                     EXBNDA   238
  190 CONTINUE                                                        EXBNDA   239
*                                                                     EXBNDA   240
  200 CONTINUE                                                        EXBNDA   241
*                                                                     EXBNDA   242
*                                                                     EXBNDA   243
*     READ OLD UGV                                                    EXBNDA   244
*                                                                     EXBNDA   245
      OUGV=TRASH                                                      EXBNDA   246
      CALL RNBND(OUGV,ONI2,ONJ2,KF,LOUV,1,ONI2,1,ONJ2,1,KF,1,LOUV     EXBNDA   247
     . , LU,.TRUE.)                                                   EXBNDA   248
*                                                                     EXBNDA   249
*     DO THE INTERPOLATION                                            EXBNDA   250
*                                                                     EXBNDA   251
      IFM1=IF - 1                                                     EXBNDA   252
      DO 700 I=2,IFM1                                                 EXBNDA   253
      XLAM=LAM(I)                                                     EXBNDA   254
*                                                                     EXBNDA   255
*     THIS IS NOT CORRECT AT THE CORNERS                              EXBNDA   256
*                                                                     EXBNDA   257
      IF (I.EQ.2    ) XLAM=LAMBAR(2)                                  EXBNDA   258
      IF (I.EQ.IFM1) XLAM=LAMBAR(IF)                                  EXBNDA   259
*                                                                     EXBNDA   260
      DO 610 IO=1,ONI2M1                                              EXBNDA   261
      IF (XLAM.GT.OLAM(IO) .AND. XLAM.LE.OLAM(IO+1))                  EXBNDA   262
     .  GO TO 615                                                     EXBNDA   263
  610 CONTINUE                                                        EXBNDA   264
      ENCODE(80,911,MES) I,XLAM                                       EXBNDA   265
  911 FORMAT (" LAM(",I2,")=",1PE10.3," NOT ON OLD MESH ..."          EXBNDA   266
     . ,"EXBNDA$")                                                    EXBNDA   267
      CALL STOPP(MES)                                                 EXBNDA   268
  615 CONTINUE                                                        EXBNDA   269
      IF (XLAM .EQ. OLAM(ONI2M1)) IO=IO + 1                           LO105048   3
      AO=( XLAM-OLAM(IO) )  /  ( OLAM(IO+1)-OLAM(IO) )                EXBNDA   270
      OMAO=1. - AO                                                    EXBNDA   271
      A(1)=OMAO                                                       EXBNDA   272
      A(2)=AO                                                         EXBNDA   273
      A(3)=OMAO                                                       EXBNDA   274
      A(4)=AO                                                         EXBNDA   275
*                                                                     EXBNDA   276
*                                                                     EXBNDA   277
      JFM1=JF - 1                                                     EXBNDA   278
      IF (I.NE.2 .AND. I.NE.IFM1) GO TO 616                           EXBNDA   279
```

```
      JI=1
      GO TO 617
  616 CONTINUE
      JI=JFM1 - 2
  617 CONTINUE
      DO 690 J=2,JFM1,JI
      XPHI=PHI(J)
*
*     THIS IS NOT CORRECT NEAR THE CORNERS
*
      IF (J.EQ.2    ) XPHI=PHIBAR(2)
      IF (J.EQ.JFM1) XPHI=PHIBAR(JF)
*
      DO 620 J0=1,ONJ2M1
      IF (XPHI.GT.OPHI(J0) .AND. XPHI.LE.OPHI(J0+1))
     *   GO TO 625
  620 CONTINUE
      ENCODE (80,912,MES) J,XPHI
  912 FORMAT (' PHI(',I2,')=',1PE10.3,' NOT ON OLD MESH ... '
     * , 'EXBNDAB')
      CALL STOPP (MES)
  625 CONTINUE
      IF (XPHI .EQ. OPHI(ONJ2M1)) J0=J0 + 1
      B0=( XPHI-OPHI(J0) )  /  ( OPHI(J0+1)-OPHI(J0) )
      OMB0=1. - B0
      B(1)=OMB0
      B(2)=OMB0
      B(3)=B0
      B(4)=B0
*
*
      DO 680 K=2,KFM1
*
*     FIND K AND INTERPOLATION FACTORS FOR 4 CORNERS
*
      DO 640 N=1,4
*
      USE(N)=1.
      DO 630 K0=2,OKFM2
      IF (ZBK(I,J,K).GE.OZBK(I0+IOF(N),J0+JOF(N),K0   ) .AND.
     *    ZBK(I,J,K).LE.OZBK(I0+IOF(N),J0+JOF(N),K0+1) ) GO TO 635
  630 CONTINUE
      USE(N)=0.
      K0=2
  635 CONTINUE
      K4(N)=K0
      C4(N)=( ZBK(I,J,K) -      OZBK(I0+IOF(N),J0+JOF(N),K0) ) /
     *       (OZBK(I0+IOF(N),J0+JOF(N),K0+1) -
     *                          OZBK(I0+IOF(N),J0+JOF(N),K0) )
      OMC4(N)=1. - C4(N)
  640 CONTINUE
*
*     DO INTERPOLATION
*
      IF (USE(1)+USE(2)+USE(3)+USE(4) .EQ. 0.) GO TO 655
*
      DO 650 L=1,2
      ANSR(L)=0.
```

```
      DO 650 N=1,4
      ANSR(L)=ANSR(L) +
     . ( OMG4(N)*DU4V(I0+IOF(N),J0+JOF(N),K4(N)   ,L)
     .  +   C4(N)*DU4V(I0+IOF(N),J0+JOF(N),K4(N)+1,L) ) * A(N) * B(N)
     .                                                 * USE(N)
  650 CONTINUE
*
      FACT=0.
      DO 652 N=1,4
  652 FACT=FACT + A(N) * B(N) * USE(N)
*
      IF (FACT .EQ. 0.) GO TO 655
*
      FACT=1. / FACT
      DO 653 L=1,2
  653 ANSR(L)=ANSR(L) * FACT
*
      GO TO 658
*
  655 CONTINUE
      DO 656 L=1,2
      ANSR(L)=0.
  656 CONTINUE
*
  658 CONTINUE
*
      DO 670 L=1,2
      IF (I.NE.2) GO TO 662
*
*     LEFT EDGE
*
      EXUV2(J,K,1,L)=ANSR(L)
      GO TO 670
  662 IF (I.EQ.IF) GO TO 668
      IF (J.NE.2) GO TO 664
*
*     BOTTOM EDGE
*
      EXUV1(I,K,1,L)=ANSR(L)
      GO TO 670
*
*     TOP EDGE
*
  664 EXUV1(I,K,2,L)=ANSR(L)
      GO TO 670
*
*     RIGHT EDGE
*
  668 EXUV2(J,K,2,L)=ANSR(L)
*
  670 CONTINUE
*
  680 CONTINUE
*
  690 CONTINUE
*
  700 CONTINUE
*
```

```
*      DO INTERPOLATION FOR PI                                        EXBNDA     395
*                                                                     EXBNDA     396
       OPI=TRASH                                                      EXBNDA     397
       CALL RNBNDO(OPI,ONI1,ONJ1,KF,1,1,ONI1,1,ONJ1,1,KF,1,1          EXBNDA     398
     . , LU,.TRUE.)                                                   EXBNDA     399
*                                                                     EXBNDA     400
*      DO THE INTERPOLATION                                           EXBNDA     401
*                                                                     EXBNDA     402
       DO 1200 I=2,IF                                                 EXBNDA     403
*                                                                     EXBNDA     404
       DO 1110 IO=1,ONI1M1                                            EXBNDA     405
       IF (LAMBAR(I).GT.OLBAR(IO) .AND. LAMBAR(I).LE.OLBAR(IO+1))     EXBNDA     406
     .  GO TO 1115                                                    EXBNDA     407
 1110  CONTINUE                                                       EXBNDA     408
       PRINT 1966,(OLBAR(IP),IP=1,ONI1M1)                             EXBNDA     409
 1966  FORMAT (/," OLBAR= ",/,(10(2X,1PE11.4)))                       EXBNDA     410
       ENCODE(80,1901,MES) I,LAMBAR(I)                                EXBNDA     411
 1901  FORMAT (" LAMBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ..."      EXBNDA     412
     . ,"EXBNDAS")                                                    EXBNDA     413
       CALL STOPP(MES)                                                EXBNDA     414
 1115  CONTINUE                                                       EXBNDA     415
       IF (LAMBAR(I) .EQ. OLBAR(ONI1M1)) IO=IO + 1                    L0105040     9
       AO=( LAMBAR(I)-OLBAR(IO) )  /  ( OLBAR(IO+1)-OLBAR(IO) )       EXBNDA     416
       OMAO=1. - AO                                                   EXBNDA     417
       A(1)=OMAO                                                      EXBNDA     418
       A(2)=AO                                                        EXBNDA     419
       A(3)=OMAO                                                      EXBNDA     420
       A(4)=AO                                                        EXBNDA     421
*                                                                     EXBNDA     422
*                                                                     EXBNDA     423
       IF (I.NE.2 .AND. I.NE.IF) GO TO 1116                           EXBNDA     424
       JI=1                                                           EXBNDA     425
       GO TO 1117                                                     EXBNDA     426
 1116  CONTINUE                                                       EXBNDA     427
       JI=JF - 2                                                      EXBNDA     428
 1117  CONTINUE                                                       EXBNDA     429
       DO 1190 J=2,JF,JI                                              EXBNDA     430
*                                                                     EXBNDA     431
       DO 1120 JO=1,ONJ1M1                                            EXBNDA     432
       IF (PHIBAR(J).GT.OPBAR(JO) .AND. PHIBAR(J).LE.OPBAR(JO+1))     L0105040    11
     .  GO TO 1125                                                    EXBNDA     434
 1120  CONTINUE                                                       EXBNDA     435
       PRINT 1967,(OPBAR(JP),JP=1,ONJ1M1)                             EXBNDA     436
 1967  FORMAT (/," OPBAR= ",/,(10(2X,1PE11.4)))                       EXBNDA     437
       ENCODE (80,1902,MES) J,PHIBAR(J)                               EXBNDA     438
 1902  FORMAT (" PHIBAR(",I2,")=",1PE10.3," NOT ON OLD MESH ... "     EXBNDA     439
     . , "EXBNDAS")                                                   EXBNDA     440
       CALL STOPP (MES)                                               EXBNDA     441
 1125  CONTINUE                                                       EXBNDA     442
       IF (PHIBAR(J) .EQ. OPBAR(ONJ1M1)) JO=JO + 1                    L0105040    13
       BO=( PHIBAR(J)-OPBAR(JO) )  /  ( OPBAR(JO+1)-OPBAR(JO) )       EXBNDA     443
       OMBO=1. - BO                                                   EXBNDA     444
       B(1)=OMBO                                                      EXBNDA     445
       B(2)=OMBO                                                      EXBNDA     446
       B(3)=BO                                                        EXBNDA     447
       B(4)=BO                                                        EXBNDA     448
*                                                                     EXBNDA     449
*                                                                     EXBNDA     450
```

```
*       (I,J+1)   3-----------------------------4  (I+1,J+1)
*                 !                             !
*                 !                             !
*                 !                             !
*                 !                             !
*                 !                             !
*       (I,J)     1-----------------------------2  (I+1,J)
*
*    X=X(1)* OMA* OMB + X(2)*   A* OMB + X(3)* OMA*   B + X(4)*   A*   B
*
*    X=X(1)*A(1)*B(1) + X(2)*A(2)*B(2) + X(3)*A(3)*B(3) + X(4)*A(4)*B(4)
*
*
* *** DO INTERPOLATION FOR PI
*
      KFM1=KF - 1
      DO 1100 K=2,KFM1
*
*     FIND K AND INTERPOLATION FACTORS FOR 4 CORNERS
*
      DO 1140 N=1,4
*
      USE(N)=1.
      DO 1130 K0=2,OKFM2
      IF (ZBK(I,J,K).GE.OZBK(I0+IOF(N),J0+JOF(N),K0  ) .AND.
     .    ZBK(I,J,K).LE.OZBK(I0+IOF(N),J0+JOF(N),K0+1) ) GO TO 1135
 1130 CONTINUE
      USE(N)=0.
      K0=2
 1135 CONTINUE
      K4(N)=K0
      C4(N)=( ZBK(I,J,K) -      OZBK(I0+IOF(N),J0+JOF(N),K0) ) /
     .      (OZBK(I0+IOF(N),J0+JOF(N),K0+1) -
     .                        OZBK(I0+IOF(N),J0+JOF(N),K0) )
      OMC4(N)=1. - C4(N)
 1140 CONTINUE
*
*     DO INTERPOLATION
*
      IF (USE(1)+USE(2)+USE(3)+USE(4) .EQ. 0.) GO TO 1155
*
      L=1
      ANSR(L)=0.
      DO 1150 N=1,4
      ANSR(L)=ANSR(L) +
     . ( OMC4(N)*OPI(I0+IOF(N),J0+JOF(N),K4(N)  )
     .  +  C4(N)*OPI(I0+IOF(N),J0+JOF(N),K4(N)+1) ) * A(N) * B(N)
     .                                                  * USE(N)
 1150 CONTINUE
*
      FACT=0.
      DO 1152 N=1,4
 1152 FACT=FACT + A(N) * B(N) * USE(N)
*
      IF (FACT .EQ. 0.) GO  3 1155
*
      FACT=1. / FACT
```

```
      L=1
      ANSR(L)=ANSR(L) * FACT
*
      GO TO 1150
*
 1155 CONTINUE
      L=1
      CALL CASEBB(ANSR(L),ZBK(I,J,K),OZBK,ONI2,ONJ2,OKFN1
     * , OPI(1,1,1),ONI1,ONJ1,KF,IOF,JOF,IO,JO,2,OKFN1,A,B
     * , ERROR)
      IF (ERROR) GO TO 1157
 1156 CONTINUE
      GO TO 1150
 1157 CONTINUE
      PRINT 1940,I,J,K,ZBK(I,J,K)
      DO 1999 N=1,4
      PRINT 1941,(OZBK(IO+IOF(N),JO+JOF(N),KP),KP=2,OKFN1)
 1999 CONTINUE
*
 1940 FORMAT ("  ZBK(", I2 , "," , I2 , "," , I2 ,")= ",1PE11.4)
 1941 FORMAT (/,"   OZBK=",5(3X,1PE11.4)
     * , /,    ("              ",5(3X,1PE11.4)))
      CALL STOPP(" POINT TOO DEEP IN EXBNDAS")
*
 1150 CONTINUE
*
      L=1
      IF (I.NE.2) GO TO 1162
*
*     LEFT EDGE
*
      EXPI2(J,K,1)=ANSR(L)
      GO TO 1170
 1162 IF (I.EQ.IF) GO TO 1160
      IF (J.NE.2) GO TO 1164
*
*     BOTTOM EDGE
*
      EXPI1(I,K,1)=ANSR(L)
      GO TO 1170
*
*     TOP EDGE
*
 1164 EXPI1(I,K,2)=ANSR(L)
      GO TO 1170
*
*     RIGHT EDGE
*
 1160 EXPI2(J,K,2)=ANSR(L)
*
 1170 CONTINUE
*
 1180 CONTINUE
*
 1190 CONTINUE
*
 1200 CONTINUE
*
```

```
573     *                                          EXBNDA    567
574          RETURN                                EXBNDA    568
575          END                                   EXBNDA    569

           575 ACTIVE LINE(S)         3 INACTIVE LINE(S)

8E FLUKST
```

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*** SMS189 : DECK FLUXST   IS EDITED FROM SPL       FILE
CREATED ON 08/16/83 AT 15:14:31          LAST UPDATED ON 02/28/84 AT 10:58:37 BY SMS VERSION 5.27
LANGUAGE:               USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L081683F  L081883A  L081883B  L082983B  L020384A  L021384A  L022884A

              SUBROUTINE FLUXST                                              L021384A
        *                                                                    L021384A
        *     SETUP IMPOSED FLUX                                             L021384A
        *                                                                    L021384A
        *     IF DINFLS > 1.E10 THEN USE THE OLD FORMULATION (NO SIGN CHANGE)  L021384A
        *                                                                    L021384A
        *     IF DINFLS < 1.E10 THEN ADJUST SOMETHING TO GET:                L021384A
        *                  (INFLOW/OUTFLOW)=ABS(DINFLR)                      L021384A
        *                                                                    L021384A
        *     IF DINFLR > 0    THEN ADJUST DINFLS                            L021384A
        *     IF DINFLR < 0    THEN ADJUST DINFL                             L021384A
        *                                                                    L021384A
        *CALL ALLMAC                                                         L021384A
        *                                                                    L021384A
              INTEGER ITOLER/2/,ICK(4)/0,0,0,0/,MITER/5/                     L021384A
              LOGICAL FUDGE                                                  L021384A
        *                                                                    L021384A
        *     ON K LOOPS, WE ARE WORKING AT K=K+1, SO RANGE IS REALLY        L021384A
        *       FROM 2 -> KF                                                 L021384A
        *                                                                    L021384A
        *     USE ONLY INTERNAL POINTS  (LOOP TO KFM2)                       L021384A
        *                                                                    L021384A
              KFM2=KFM1 - 1                                                  L021384A
        *                                                                    L021384A
              PWEST=0.                                                       L021384A
              PEAST=0.                                                       L021384A
              PSOUTH=0.                                                      L021384A
              PNORTH=0.                                                      L021384A
        *                                                                    L021384A
        *****                                                                L021384A
        ***** WEST EDGE                                                      L021384A
        *****                                                                L021384A
              IF (FLUXIN(1) .EQ. 0.) GO TO 190                               L021384A
        *                                                                    L021384A
        *     I AT EDGE SHOULD REALLY BE 1.5, BUT ALL QUANTITIES ARE         L021384A
        *       SYMMETRIC, SO WE CAN USE I=2                                 L021384A
        *                                                                    L021384A
              I=2                                                            L021384A
        *                                                                    L021384A
              ICK(1)=0                                                       L021384A
              R1=0.                                                          L021384A
              S1=0.                                                          L021384A
              IF (DINFLR(1).LT.0.) S1=1000.                                  L021384A
        103   CONTINUE                                                       L021384A
              ICK(1)=ICK(1) + 1                                              L021384A
        *                                                                    L021384A
              K=0                                                            L021384A
              CALL ZSETC(K+2)                                                L021384A
              CALL FDEP2(K+1,1)                                              L021384A
        *                                                                    L021384A
```

```
              FWEST=0.                                              L021384A    53
              PWEST=0.                                              L021384A    54
        *                                                           L021384A    55
              DO 165 K=1,KFM2                                       L021384A    56
        *                                                           L021384A    57
              CALL ZSET3(K+2)                                       L021384A    58
              CALL KDEP2(K+1,1)                                     L021384A    59
        *                                                           L021384A    60
              CON=1. / DINFL(1)                                     L021384A    61
              DO 105 J=1,JF                                         L021384A    62
              D1(I,J)=ZBARK(I,J,1) * CON                            L021384A    63
        105   D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,1)                    L021384A    64
        *                                                           L021384A    65
              CON=1. / DBOTBL(1)                                    L021384A    66
              DO 110 J=1,JF                                         L021384A    67
              D1(I,J)=D1(I,J) + 1.                                  L021384A    68
        110   D2(I,J)=D2(I,J) * CON                                 L021384A    69
        *                                                           L021384A    70
              IF (DINFLS(1) .GT. 1.E10) GO TO 119                   L021384A    71
        *                                                           L021384A    72
              DO 112 J=1,JF                                         L021384A    73
              D5(I,J)=DINFLS(1) - ZBARK(I,J,2)                      L021384A    74
        112   D6(I,J)=DINFLS(1) + ZBARK(I,J,2)                      L021384A    75
        *                                                           L021384A    76
              DO 114 J=1,JF                                         L021384A    77
        114   D6(I,J)=D6(I,J) * D1(I,J)                             L021384A    78
        *                                                           L021384A    79
              DO 116 J=1,JF                                         L021384A    80
        116   D1(I,J)=D5(I,J) / D6(I,J)                             L021384A    81
              GO TO 122                                             L021384A    82
        *                                                           L021384A    83
        119   CONTINUE                                              L021384A    84
              DO 120 J=1,JF                                         L021384A    85
        120   D1(I,J)=1. / D1(I,J)                                  L021384A    86
        122   CONTINUE                                              L021384A    87
        *                                                           L021384A    88
              DO 130 J=1,JF                                         L021384A    89
              D3(I,J)=D1(I,J) * D2(I,J)                             L021384A    90
        130   D4(I,J)=ABS(D1(I,J)) + D2(I,J)                        L022884A     4
        *                                                           L021384A    92
              DO 140 J=1,JF                                         L021384A    93
        140   D3(I,J)=D3(I,J) / D4(I,J)                             L021384A    94
        *                                                           L021384A    95
              DO 150 J=1,JF                                         L021384A    96
        150   D4(I,J)=D3(I,J) * ALFL(I,J)                           L021384A    97
        *                                                           L021384A    98
              DO 160 J=1,JF                                         L021384A    99
              FWEST=FWEST +        D4(I,J)                          L021384A   100
        160   PWEST=PWEST + AMAX1(D4(I,J),0.)                       L021384A   101
        *                                                           L021384A   102
        165   CONTINUE                                              L021384A   103
        *                                                           L021384A   104
              IF (DINFLS(1) .GT. 1.E10) GO TO 190                   L021384A   105
        *                                                           L021384A   106
              RATIO=  FWEST / (FWEST - PWEST)                       L021384A   107
              IF (FUDGE(RATIO,DINFLR(1),ITOLER,.TRUE.)) GO TO 185   L021384A   108
              IF (IC(1) .EQ. MITER) GO TO 185                       L021384A   109
        *                                                           L021384A   110
```

```
*     ADJUST
*
      RO=R1
      SO=S1
      S1=DINFLS(1)
      IF (DINFLR(1) .LT. 0.) S1=DINFL(1)
      R1=RATIO
      R2=ABS(DINFLR(1))
      CON=S1 + (R2-R1) * (S1-SO) / (R1-RO)
      IF (DINFLR(1) .GT. 0.) DINFLS(1)=CON
      IF (DINFLR(1) .LT. 0.) DINFL (1)=CON
      GO TO 103
*
185   CONTINUE
      DINFLR(1)=RATIO
*
190   CONTINUE
*
*****
***** EAST EDGE
*****
      IF (FLUXIN(2) .EQ. 0.) GO TO 290
*
*     1 AT EDGE SHOULD REALLY BE IF-.5, BUT ALL QUANTITIES ARE
*       SYMMETRIX, SO WE CAN USE I=IF-1
*
      I=IFM1
      ICK(2)=0
      R1=0.
      S1=0.
      IF (DINFLR(2).LT.0.) S1=1000.
203   CONTINUE
      ICK(2)=ICK(2) + 1
*
      K=0
      CALL ZSET3(K+2)
      CALL KDEP2(K+1,1)
*
      FEAST=0.
      PEAST=0.
*
      DO 265 K=1,KFM2
*
      CALL ZSET3(K+2)
      CALL KDEP2(K+1,1)
*
      CON=1. / DINFL(2)
      DO 205 J=1,JF
      D1(I,J)=ZBARK(I,J,2) * CON
205   D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)
*
      CON=1. / DHOTBC(2)
      DO 210 J=1,JF
      D1(I,J)=D1(I,J) + 1.
210   D2(I,J)=D2(I,J) * CON
*
      IF (DINFLS(2) .GT. 1.E10) GO TO 219
*
```

```
      DO 212 J=1,JF                                          L021384A  169
      D5(I,J)=DINFLS(2) - ZBAR(I,J,2)                        L021384A  170
212   D6(I,J)=DINFLS(2) + ZBAR(I,J,2)                        L021384A  171
*                                                            L021384A  172
      DO 214 J=1,JF                                          L021384A  173
214   D6(I,J)=D6(I,J) * D1(I,J)                              L021384A  174
*                                                            L021384A  175
      DO 216 J=1,JF                                          L021384A  176
216   D1(I,J)=D5(I,J) / D6(I,J)                              L021384A  177
      GO TO 222                                              L021384A  178
*                                                            L021384A  179
219   CONTINUE                                               L021384A  180
      DO 220 J=1,JF                                          L021384A  181
220   D1(I,J)=1. / D1(I,J)                                   L021384A  182
222   CONTINUE                                               L021384A  183
*                                                            L021384A  184
      DO 230 J=1,JF                                          L021384A  185
      D3(I,J)=D1(I,J) * D2(I,J)                              L021384A  186
230   D4(I,J)=ABS(D1(I,J)) + D2(I,J)                         L022884A    6
*                                                            L021384A  188
      DO 240 J=1,JF                                          L021384A  189
240   D3(I,J)=D3(I,J) / D4(I,J)                              L021384A  190
*                                                            L021384A  191
      DO 250 J=1,JF                                          L021384A  192
250   D4(I,J)=D3(I,J) * ALFL(I,J)                            L021384A  193
*                                                            L021384A  194
      DO 260 J=1,JF                                          L021384A  195
      FEAST=FEAST +       D4(I,J)                            L021384A  196
260   PEAST=PEAST + AMAX1(D4(I,J),0.)                        L021384A  197
*                                                            L021384A  198
265   CONTINUE                                               L021384A  199
*                                                            L021384A  200
      IF (DINFLS(2) .GT. 1.E10) GO TO 290                    L021384A  201
*                                                            L021384A  202
      RATIO=  FEAST / (FEAST - PEAST)                        L021384A  203
      IF (FUDGE(RATIO,DINFLR(2),ITOLER,.TRUE.)) GO TO 285    L021384A  204
      IF (IC(2) .EQ. MITER) GO TO 285                        L021384A  205
*                                                            L021384A  206
*     ADJUST                                                 L021384A  207
*                                                            L021384A  208
      R0=R1                                                  L021384A  209
      S0=S1                                                  L021384A  210
      S1=DINFLS(2)                                           L021384A  211
      IF (DINFLR(2) .LT. 0.) S1=DINFL(2)                     L021384A  212
      R1=RATIO                                               L021384A  213
      R2=ABS(DINFLR(2))                                      L021384A  214
      CON=S1 + (R2-R1) * (S1 -S0) / (R1-R0)                  L021384A  215
      IF (DINFLR(2) .GT. 0.) DINFLS(2)=CON                   L021384A  216
      IF (DINFLR(2) .LT. 0.) DINFL(2)=CON                    L021384A  217
      GO TO 2..                                              L021384A  218
*                                                            L021384A  219
285   CONTINUE                                               L021384A  220
      DINFLF(2)=RATIO                                        L021384A  221
*                                                            L021384A  222
290   CONTINUE                                               L021384A  223
*****                                                        L021384A  224
***** SOUTH FLOW                                             L021384A  225
*****                                                        L021384A  226
```

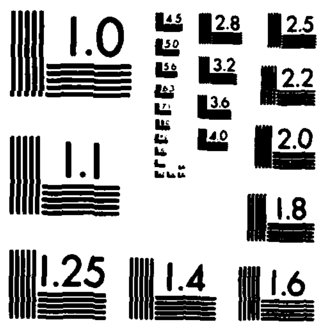
```
      IF (FLUXIN(3) .EQ. 0.) GO TO 390
*
*     J AT EDGE SHOULD REALLY BE 1.5, BUT ALL QUANTITIES ARE
*       SYMMETRIX, SO WE CAN USE J = 2
*
      J=2
*
      ICK(3)=0
      R1=0.
      S1=0.
      IF (DINFLK(3).LT.0.) S1=1000
303   CONTINUE
      ICK(3)=ICK(3) + 1
*
      K=0
      CALL ZSET3(K+2)
      CALL KDEP2(K+1,1)
*
      FSOUTH=0.
      PSOUTH=0.
*
      DO 365 K=1,KFM2
*
      CALL ZSET3(K+2)
      CALL KDEP2(K+1,1)
*
      CON=1. / DINFL(3)
      DO 305 I=1,IF
      D1(I,J)=ZBARK(I,J,2) * CON
305   D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)
*
      CON=1. / DBOTBL(3)
      DO 310 I=1,IF
      D1(I,J)=D1(I,J) + 1.
310   D2(I,J)=D2(I,J) * CON
*
      IF (DINFLS(3) .GT. 1.E10) GO TO 319
*
      DO 312 I=1,IF
      D5(I,J)=DINFLS(3) - ZBARK(I,J,2)
312   D6(I,J)=DINFLS(3) + ZBARK(I,J,2)
*
      DO 314 I=1,IF
314   D6(I,J)=D6(I,J) * D1(I,J)
*
      DO 316 I=1,IF
316   D1(I,J)=D5(I,J) / D6(I,J)
      GO TO 322
*
319   CONTINUE
      DO 320 I=1,IF
320   D1(I,J)=1. / D1(I,J)
322   CONTINUE
*
      DO 330 I=1,IF
      D3(I,J)=D1(I,J) * D2(I,J)
330   D4(I,J)=ABS(D1(I,J)) + D2(I,J)
*
```

```
      DO 340 I=1,IF
340   D3(I,J)=D3(I,J) / D4(I,J)
*
      DO 350 I=1,IF
350   D4(I,J)=D3(I,J) * ALFP(I,J)
*
      DO 360 I=1,IF
      FSOUTH=FSOUTH +       D4(I,J)
360   PSOUTH=PSOUTH + AMAX1(D4(I,J),0.)
*
365   CONTINUE
*
      IF (DINFLS(3) .GT. 1.E10) GO TO 390
*
      RATIO= - PSOUTH / (FSOUTH - PSOUTH)
      IF (FUDGE(RATIO,DINFLR(3),ITOLER,.TRUE.)) GO TO 385
      IF (ICK(3) .EQ. MITER) GO TO 385
*
*     ADJUST
*
      RO=R1
      SO=S1
      S1=DINFLS(3)
      IF (DINFLR(3) .LT. O.) S1=DINFL(3)
      R1=RATIO
      R2=ABS(DINFLR(3))
      CON=S1 + (R1-R1) * (S1-SO) / (R1-RO)
      IF (DINFLR(3) .GT. O.) DINFLS(3)=CON
      IF (DINFLR(3) .LT. O.) DINFL (3)=CON
      GO TO 303
*
385   CONTINUE
      DINFLR(3)=RATIO
*
390   CONTINUE
*****
***** NORTH EDGE
*****
      IF (FLUXIN(4) .EQ. O.) GO TO 490
*
*     J AT EDGE SHOULD REALLY BE JF-.5, BUT ALL QUANTITIES ARE
*       SYMMETRIX, SO WE CAN USE J = JF-1
*
      J=JFM1
*
      ICK(4)=0
      R1=0.
      S1=0.
      IF (DINFLR(4).LT.0.) S1=1000.
405   CONTINUE
      ICK(4)=ICK(4) + 1
*
      K=0
      CALL ...
      CALL ...
*
      FNORTH=0.
      PNORTH=0.
```

```
     *                                                    L021384A 343
        DO 465 K=1,KFM2                                   L021384A 344
     *                                                    L021384A 345
        CALL ZSETS(K+2)                                   L021384A 346
        CALL KDEP2(K+1,1)                                 L021384A 347
     *                                                    L021384A 348
        CON=1. / DINFL(4)                                 L021384A 349
        DO 405 I=1,IF                                     L021384A 350
        D1(I,J)=ZBARK(I,J,2) * CON                        L021384A 351
 405    D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)                L021384A 352
     *                                                    L021384A 353
        CON=1. / DBOTBL(4)                                L021384A 354
        DO 410 I=1,IF                                     L021384A 355
        D1(I,J)=D1(I,J) + 1.                              L021384A 356
 410    D2(I,J)=D2(I,J) * CON                             L021384A 357
     *                                                    L021384A 358
        IF (DINFLS(4) .GT. 1.E10) GO TO 419               L021384A 359
     *                                                    L021384A 360
        DO 412 I=1,IF                                     L021384A 361
        D5(I,J)=DINFLS(4) - ZBARK(I,J,2)                  L021384A 362
 412    D6(I,J)=DINFLS(4) + ZBARK(I,J,2)                  L021384A 363
     *                                                    L021384A 364
        DO 414 I=1,IF                                     L021384A 365
 414    D6(I,J)=D6(I,J) * D1(I,J)                         L021384A 366
     *                                                    L021384A 367
        DO 416 I=1,IF                                     L021384A 368
 416    D1(I,J)=D5(I,J) / D6(I,J)                         L021384A 369
        GO TO 422                                         L021384A 370
     *                                                    L021384A 371
 419    CONTINUE                                          L021384A 372
        DO 420 I=1,IF                                     L021384A 373
 420    D1(I,J)=1. / D1(I,J)                              L021384A 374
 422    CONTINUE                                          L021384A 375
     *                                                    L021384A 376
        DO 430 I=1,IF                                     L021384A 377
        D3(I,J)=D1(I,J) * D2(I,J)                         L021384A 378
 430    D4(I,J)=ABS(D1(I,J)) + D2(I,J)                    L022884A  10
     *                                                    L021384A 380
        DO 440 I=1,IF                                     L021384A 381
 440    D3(I,J)=D3(I,J) / D4(I,J)                         L021384A 382
     *                                                    L021384A 383
        DO 450 I=1,IF                                     L021384A 384
 450    D4(I,J)=D3(I                  J)                  L021384A 385
     *                                                    L021384A 386
        DO 460 I=1,IF                                     L021384A 387
        FNORTH=FNORTH +        D4(I,J)                    L021384A 388
 460    PNORTH=FNORTH + AMAX1(D4(I,J),0.)                 L021384A 389
     *                                                    L021384A 390
 465    CONTINUE                                          L021384A 391
     *                                                    L021384A 392
        IF (DINFLS(4) .GE. 1.E10) GO TO 490               L021384A 393
     *                                                    L021384A 394
        RATIO   FNORTH   FNORTH   FNORTH                  L021384A 395
        IF (ABS(RATIO-1.)...) GO TO 485                   L021384A 396
        IF (...) GO TO 485                                L021384A 397
     *                                                    L021384A 398
     *  ADJUST                                            L021384A 399
     *                                                    L021384A 400
```

AD-A146 548 SIGMA CODE TESTING(U) SCIENCE APPLICATIONS INC MCLEAN 2/2
VA J L SEFTOR ET AL. 28 MAR 84 SAI-84/1073
N00014-83-C-0289

UNCLASSIFIED F/G 8/10 NL



OPY RESOLUTION TEST CHART

```
           R0=R1                                                     L021384A  401
           S0=S1                                                     L021384A  402
           S1=DINFLS(4)                                              L021384A  403
           IF (DINFLR(4) .LT. 0.) S1=DINFL(4)                        L021384A  404
           R1=RATIO                                                  L021384A  405
           R2=ABS(DINFLR(4))                                         L021384A  406
           CON=S1 + (R2-R1) * (S1-S0) / (R1-R0)                      L021384A  407
           IF (DINFLR(4) .GT. 0.) DINFLS(4)=CON                      L021384A  408
           IF (DINFLR(4) .LT. 0.) DINFL (4)=CON                      L021384A  409
           GO TO 403                                                 L021384A  410
     *                                                               L021384A  411
     485   CONTINUE                                                  L021384A  412
           DINFLR(4)=RATIO                                           L021384A  413
     *                                                               L021384A  414
     490   CONTINUE                                                  L021384A  415
     *                                                               L021384A  416
           IF (PWEST  .NE. 0.) FLUXIN(1)=FLUXIN(1) / (-PWEST )       L021384A  417
           IF (PEAST  .NE. 0.) FLUXIN(2)=FLUXIN(2) / ( PEAST )       L021384A  418
           IF (PSOUTH .NE. 0.) FLUXIN(3)=FLUXIN(3) / (-PSOUTH)       L021384A  419
           IF (PNORTH .NE. 0.) FLUXIN(4)=FLUXIN(4) / ( PNORTH)       L021384A  420
     *                                                               L021384A  421
           PRINT 900                                                 L021384A  422
           PRINT 901, PWEST,FLUXIN(1), PEAST,FLUXIN(2)               L021384A  423
         . .         PSOUTH,FLUXIN(3),PNORTH,FLUXIN(4)               L021384A  424
       900 FORMAT (///,'  INPUT FLUXES ARE POSITIVE FOR OUTFLOW.  THESE'   L021384A  425
         . . ' FLUXES ARE CORRECTED FOR MESH DIRECTION.')            L021384A  426
       901 FORMAT (///,' FLUXST:        AREA IN   FLUX/AREA',/       L021384A  427
         . .          '          WEST ',1PE10.3,1X,1PE10.3,/         L021384A  428
         . .          '          EAST ',1PE10.3,1X,1PE10.3,/         L021384A  429
         . .          '         SOUTH ',1PE10.3,1X,1PE10.3,/         L021384A  430
         . .          '         NORTH ',1PE10.3,1X,1PE10.3)          L021384A  431
     *                                                               L021384A  432
           PRINT 973,DINFL,DBOTBL,DINFLS,DINFLR,IC                   L021384A  433
       973 FORMAT (//,T20,'   WEST',T35,'   EAST',T50,'  SOUTH'      L021384A  434
         . . T65,'  NORTH',/                                         L021384A  435
         . . T10,' DINFL:',T20,4(1PE10.3,5X),/                       L021384A  436
         . . T10,'DBOTBL:',T20,4(1PE10.3,5X),/                       L021384A  437
         . . T10,'DINFLS:',T20,4(1PE10.3,5X),/                       L021384A  438
         . . T10,'DINFLR:',T20,4(1PE10.3,5X),/                       L021384A  439
         . . T10,'# ITER:',T20,4(    I10,5X),//)                     L021384A  440
     *                                                               L021384A  441
     *                                                               L021384A  442
           RETURN                                                    L021384A  443
           END                                                       L021384A  444
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442 ACTIVE LINE(S)   197 INACTIVE LINE(S)

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*** SMS189 1 DECK PPARAM   IS EDITED FROM SPL      FILE
CREATED ON 03/23/82 AT 10:26:52          LAST UPDATED ON 08/29/83 AT 14:30:47 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L040202A  L040702A  L040702B  L092302A  L072603B  L081603A  L081603B  L082903A

          SUBROUTINE PPARAM(DT)                                                      L040702A     3
      *                                                                              PPARAM       2
      *   THIS SUBROUTINE PRINTS THE RUN PARAMETERS                                  PPARAM       3
      *                                                                              PPARAM       4
      *CALL ALLMAC                                                                   PPARAM       5
      *                                                                              L040202A     3
      *CALL ASTUPC                                                                   L040202A     4
      *                                                                              PPARAM       6
          PRINT 970,AINV   ,BETAN ,BETAV ,FIXINT,THTSLA,THTSLD                       PPARAM       8
       .          ,CASE   ,CG     ,CV     ,FIXTS ,THTSPA,THTSPD                      PPARAM       9
       .          ,CD     ,DELT   ,DT     ,FIXUV ,THTSSA,THTSSD                      PPARAM      10
       .          ,FORCIN,G      ,HOUR   ,FIXZS ,THUVLA,THUVLD                       PPARAM      11
       .          ,LSQ    ,NSTEP  ,OMEGA  ,VFIXTS,THUVPA,THUVPD                      PPARAM      12
       .          ,RARO   ,RC     ,RHOO   ,SMOOTH,THUVSA,THUVSD                      PPARAM      13
       .          ,SALT   ,TMAX   ,TINNN  ,VFIXUV,ADBZS ,ADBINT                      PPARAM      14
       .          ,UMAX   ,ZV     ,TINDEP,THUVF ,KS     ,ZSN                         PPARAM      15
      970 FORMAT (///T5,'AINV   =',1PE12.5,T25,'BETAN =',0PF5.2,T45,'BETAV ='        PPARAM      16
       . , F5.2,T70,'FIXINT=',L1,T85,'THTSLA=',F5.2,T105,'THTSLD=',F5.2              PPARAM      17
       . , /,T5,'CASE   =',I2,T25,'CG     =',F5.2,T45,'CV     =',1PE10.3,T70         PPARAM      18
       . , 'FIXTS =',L1,T85,'THTSPA=',0PF5.2,T105,'THTSPD=',F5.2,/,T5                PPARAM      19
       . , 'CD     =',1PE10.3,T25,'DELT  =',0PF7.2,T45,'DT     =',F10.1              PPARAM      20
       . , T70,'FIXUV =',L1,T85,'THTSSA=',F5.2,T105,'THTSSD=',F5.2                   PPARAM      21
       . , /,T5,'FORCIN=',L1,T25,'G      =',0PF6.2,T45,'HOUR  ='                     PPARAM      22
       . , F6.2,T70,'FIXZS =',L1,T85,'THUVLA=',F5.2,T105,'THUVLD='                   PPARAM      23
       . , F5.2,/,T5,'LSQ    =',1PE10.3,T25,'NSTEP =',I5,T45,'OMEGA ='               PPARAM      24
       . , 1PE12.5,T70,'VFIXTS=',1X,L1,T85,'THUVPA=',0PF5.2,T105,'THUVPD='           PPARAM      25
       . , F5.2,/,T5,'RARO   =',1PE12.5,T25,'RC     =',0PF7.3,T45,'RHOO   ='         PPARAM      26
       . , F10.7,T70,'SMOOTH=',L1,T85,'THUVSA=',F5.2,T105,'THUVSD='                  PPARAM      27
       . , F5.2,/,T5,'SALT   =',F7.2,T25,'TMAX   =',F7.2,T45,'TINNN =',I4            PPARAM      28
       . , T70,'VFIXUV=',L1,T85,'ADBZS >',F6.3,T105,'ADBINT=',F6.3,/,T5              PPARAM      29
       . , 'UMAX   =',F7.2,T25,'ZV     =',1PE10.3,T45,'TINDEP=',0PF7.1               PPARAM      30
       . , T70,'THUVF =',0PF5.2,T85                                                  PPARAM      31
       . , 'KS     =',0PF5.2,T105,'ZSN    =',F7.1)                                   PPARAM      32
          PRINT 971,NBATTN,DTMULT,DTMAX ,DMPGPI                                      PPARAM      33
       . , AUPUND,ASRZSN,OLDPI,DMPPII,DOFPII                                         PPARAM      34
       . , NGRPPT,GSURF,NZSITR,ZSFERR                                                PPARAM      35
       . , CJCOEF,OJCOEF,ZSINI,CZSINI                                                PPARAM      36
       . , ZSFCHK,ZSFA,UVFDIV,REFBN,REFBF                                            PPARAM      37
       . , ZSINAN,DELTTS,NPPAGE,REFBR,QRMULT,SURFA                                   PPARAM      38
       . , IFNITR,FIA,FIERR,FICHK,DOVCHK,KVN,UMAXN                                   PPARAM      39
       . , FTNTCH,CONDEN,XLSPAC,XPSPAC                                               L092302A     3
      971 FORMAT (/,T5,'NBATTN=',1PE12.5,T25,'DTMULT=',0PF5.2,T45,'DTMAX ='          PPARAM      41
       . , 1PE12.5,T70,'DMPGPI=',L1                                                  PPARAM      42
       . , T85,'AUPUND=',0PF5.2                                                      PPARAM      43
       . , T105,'ASRZSN=',0PF8.3                                                     PPARAM      44
       . , /,T5,'OLDPI =',L1                                                         PPARAM      45
       . , T25,'DMPPII=',L1,T45,'DOFPII=',0PF8.1                                     PPARAM      46
       . , T70,'NGRPPT=',I2,T85,'GSURF =',0PF6.2                                     PPARAM      47
       . , T105,'NZSITR=',I3,/,                    T25,'ZSFERR=',0PF7.3              PPARAM      48
       . , T45,'CJCOEF=',0PF6.3,T70,'OJCOEF=',A4                                     PPARAM      49
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      . , T05,"ZSINI =",I3,T105,"CZSINI=",1PE10.3                     PPARAM   50
      . , /,T5,"ZSFCHK=",I6                                           PPARAM   51
      . , T45,"ZSFA  =",1PE10.3,T70,"UVFDIV=",L1                      PPARAM   52
      . , T05,"REFOR =",I2,T105,"REFOF =",I6                          PPARAM   53
      . , /,T5,"ZSIMAN=",I4,T25,"DELTTS=",L1,T45,"NPPAGE=",I3         PPARAM   54
      . , T70,"REFOR =",0PF6.3,T05,"ORMULT=",F6.3,T105,"SURFA =",1PE10.3  PPARAM   55
      . , /,T5,"IFNITR=",I3,T25,"FIA   =",1PE10.3,T45,"FIERR =",0PF7.3    PPARAM   56
      . , T70,"EICHK =",I3,T05,"DOTCHK=",1PE10.3,T105,"KVM   =",1PE10.3   PPARAM   57
      . , /,T5,"UMAXM =",0PF7.3,T25,"FTNTCH=",1X,L1,T45,"CONDEN=",1X,L1   PPARAM   58
      . , T70,"XLSPAC=",1PE10.3,T05,"XPSPAC=",1PE10.3)                L0023020A  5
        PRINT 972,CKM,ZCKM,FLUXIN,DINFL,DBOTBL                        L0016030   3
  972 FORMAT (/,T5,"CKM   =",1PE10.3,T25,"ZCKM  =",1PE10.3            L0029030A  3
      . , T45,"FLUXIN=",1PE10.3,T70,1PE10.3,T93,1PE10.3,T113          L0029030A  4
      . , 1PE10.3,/,T5,"DINFL =",1PE10.3,T25,"DBOTBL=",1PE10.3        L0029030A  5
      . )                                                             L0016030A  7
        IMAX=18                                                       PPARAM   60
        PRINT 910,(PC(III),III=1,IMAX)                                PPARAM   61
  910 FORMAT  (1H0,10X,"PRINT OPTIONS:",/                             PPARAM   62
      . , T11,"P1 =",I6,"  (PRINT INCREMENT FOR TIME)"                PPARAM   63
      . , T71,"P2 =",I6,"  (PRINT INCREMENT FOR T)",/                 PPARAM   64
      . , T11,"P3 =",I6,"  (PRINT INCREMENT FOR S)"                   PPARAM   65
      . , T71,"P4 =",I6,"  (PRINT INCREMENT FOR U)",/                 PPARAM   66
      . , T11,"P5 =",I6,"  (PRINT INCREMENT FOR V)"                   PPARAM   67
      . , T71,"P6 =",I6,"  (PRINT INCREMENT FOR Z SURFACE)",/         PPARAM   68
      . , T11,"P7 =",I6,"  (PRINT INCREMENT FOR KM)"                  PPARAM   69
      . , T71,"P8 =",I6,"  (PRINT INCREMENT FOR KV)",/                PPARAM   70
      . , T11,"P9 =",I6,"  (PRINT INCREMENT FOR T SURFACE)"           PPARAM   71
      . , T71,"P10=",I6,"  (0 TO SEE INITIAL CONDITIONS)",/           PPARAM   72
      . , T11,"P11=",I6,"  (0 TO SEE NAMELIST 9)"                     PPARAM   73
      . , T71,"P12=",I6,"  (STORE INCREMENT FOR SOUND SPEED)",/       PPARAM   74
      . , T11,"P13=",I6,"  (STORE INCREMENT FOR SURFACE TEMPERATURE)" PPARAM   75
      . , T71,"P14=",I6,"  (0 TO SEE BOTTOM DEPTH)",/                 PPARAM   76
      . , T11,"P15=",I6,"  (0 TO SEE Z BAR IJ)"                       PPARAM   77
      . , T71,"P16=",I6,"  (0 TO SEE INITIAL SURFACE TEMPERATURE)",/  PPARAM   78
      . , T11,"P17=",I6,"  (STORE INCREMENT FOR T)"                   PPARAM   79
      . , T71,"P18=",I6,"  (STORE INCREMENT FOR S)"                   PPARAM   80
      . )                                                             PPARAM   81
        IMAX=IMAX + 1                                                 PPARAM   82
        IMAX2=IMAX + 17                                               PPARAM   83
        PRINT 911,(PC(III),III=IMAX,IMAX2)                            PPARAM   84
  911 FORMAT (1X                                                      PPARAM   85
      . , T11,"P19=",I6,"  (PRINT INCREMENT FOR (RHO-RHOR)/RHOO)"     PPARAM   86
      . , T71,"P20=",I6,"  (PRINT INCREMENT FOR NSQ)",/               PPARAM   87
      . , T11,"P21=",I6,"  (PRINT INCREMENT FOR PI ARRAY)"            PPARAM   88
      . , T71,"P22=",I6,"  (PRINT INCREMENT FOR W-I)",/               PPARAM   89
      . , T11,"P23=",I6,"  (PRINT INCREMENT FOR DELTA T)"             PPARAM   90
      . , T71,"P24=",I6,"  (PRINT INCREMENT FOR DELTA S)",/           PPARAM   91
      . , T11,"P25=",I6,"  (PRINT INCREMENT FOR QCHECK)"              PPARAM   92
      . , T71,"P26=",I6,"  (0 TO SEE Z BAR K)",/                      PPARAM   93
      . , T11,"P27=",I6,"  (0 TO SEE Z BAR IJK)"                      PPARAM   94
      . , T71,"P28=",I6,"  (STORE INCREMENT FOR U)",/                 PPARAM   95
      . , T11,"P29=",I6,"  (STORE INCREMENT FOR V)"                   PPARAM   96
      . , T71,"P30=",I6,"  (PRINT INCREMENT FOR R/RC - VERT. SLICE)",/  PPARAM   97
      . , T11,"P31=",I6,"  (STORE INCREMENT FOR PE)"                  PPARAM   98
      . , T71,"P32=",I6,"  (PRINT INCREMENT FOR FLUX)",/              PPARAM   99
      . , T11,"P33=",I6,"  (STORE INCREMENT FOR FLUX)"                PPARAM  100
      . , T71,"P34=",I6,"  (PRINT INCREMENT FOR FORCING: SOLAR FLUX)",/  PPARAM  101
      . , T11,"P35=",I6,"  (PRINT INCREMENT FOR FORCING: HEAT FLUX)"  PPARAM  102
```

```
      . . T71,"P36=",I6,"  (PRINT INCREMENT FOR FORCING: WIND(U))"     PPARAM      103
      . )                                                             PPARAM      104
       IMAX=IMAX2 + 1                                                 PPARAM      105
       IMAX2=IMAX + 2                                                 L0726030      3
       PRINT 912,(PC(III),III=IMAX,IMAX2)                             PPARAM      107
  912 FORMAT (1X                                                      PPARAM      108
      . . T11,"P37=",I6,"  (PRINT INCREMENT FOR FORCING: WIND(V))"     PPARAM      109
      . . T71,"P38=",I6,"  (STORE INCREMENT FOR GEOSTROPHIC VEL (U))",/ L0726030    5
      . . T11,"P39=",I6,"  (STORE INCREMENT FOR GEOSTROPHIC VEL (V))"  L0726030      6
      . . /)                                                          PPARAM      110
C                                                                     PPARAM      111
       RETURN                                                         PPARAM      112
       END                                                            PPARAM      113

          121 ACTIVE LINE(S)          11 INACTIVE LINE(S)

OE REGNST
```

*** SMS109 : DECK REGNST   IS EDITED FROM SPL   FILE
CREATED ON 12/20/83 AT 09:59:17   LAST UPDATED ON 01/05/84 AT 13:32:24 BY SMS VERSION 5.27
LANGUAGE: USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L010504B

```
      SUBROUTINE REGNST(PHI,LAM,PBAR,LBAR,SAVPLO,SAVPHI,SAVLLO
     . , SAVLHI,SAVILO,SAVIHI,SAVJLO,SAVJHI,IF,JF,IFP1,JFP1,NREGON
     . , NREG)
*
*     THIS SUBROUTINE SETS THE REGIONS OVER WHICH DATA WILL BE
*       STORED FOR A SUBSEQUENT NESTED RUN.
*     T-S DATA WILL BE WRITTEN FROM SAVILO(1) TO SAVIHI(1) WHILE
*     U-S DATA WILL BE WRITTEN FROM SAVILO(2) TO SAVIHI(2)
*           (AND SIMILARLY FOR J)
*
      REAL*4 PHI(JF),LAM(IF),PBAR(JFP1),LBAR(IFP1),SAVPLO(1)
     . , SAVPHI(1),SAVLLO(1),SAVLHI(1)
      INTEGER*4 SAVILO(2,1),SAVIHI(2,1),SAVJLO(2,1),SAVJHI(2,1)
*
      DO  50 J=2,JF
   50 PBAR(J)=PHI(J) + PHI(J-1)
*
      DO  60 J=2,JF
   60 PBAR(J)=PBAR(J) * .5
*
      DO  70 I=2,IF
   70 LBAR(I)=LAM(I) + LAM(I-1)
*
      DO  80 I=2,IF
   80 LBAR(I)=LBAR(I) * .5
*
      PBAR(1    )=2. * PBAR(2 ) - PBAR(3    )
      PBAR(JFP1)=2. * PBAR(JF) - PBAR(JF-1)
      LBAR(1    )=2. * LBAR(2 ) - LBAR(3    )
      LBAR(IFP1)=2. * LBAR(IF) - LBAR(IF-1)
*
*     LOOP OVER REGIONS
*
      DO 1000 N=1,NREGON
*
      IF (SAVLLO(N).GT.SAVLHI(N) .OR. SAVPLO(N).GT.SAVPHI(N))
     .CALL STOPP(" ERROR IN SAVL OR SAVP INPUT ... REGNST$")
*
      DO 110 I=2,IF
      II=IF + 2 - I
      IF (LBAR(II) .LT. SAVLLO(N)) GO TO 115
  110 CONTINUE
      CALL STOPP(" ERROR IN SAVLLO IN REGNST$")
  115 CONTINUE
      SAVLLO(  N+NREG)=SAVLLO(N)
      SAVLLO(  N      )=LBAR(II)
      SAVILO(1,N      )=II
*
      IFM1=IF - 1
      DO 117 I=2,IFM1
```

```
          II=IFM1 + 2 - I                                          REGNST       51
          IF (LAM(II) .LT. SAVLLO(N+NREG)) GO TO 119               L0105048      3
      117 CONTINUE                                                 REGNST       53
          CALL STOPP(" ERROR IN SAVLLO IN REGNST(2)$")             REGNST       54
      119 CONTINUE                                                 REGNST       55
          SAVILO(2,N)=II                                           REGNST       56
    *                                                              REGNST       57
          DO 120 I=2,IF                                            REGNST       58
          IF (LBAR(I) .GT. SAVLHI(N)) GO TO 125                    REGNST       59
      120 CONTINUE                                                 REGNST       60
          CALL STOPP(" ERROR IN SAVLHI IN REGNST$")                REGNST       61
      125 CONTINUE                                                 REGNST       62
          SAVLHI(  N+NREG)=SAVLHI(N)                               REGNST       63
          SAVLHI(  N      )=LBAR(I)                                REGNST       64
          SAVIHI(1,N      )=I                                      REGNST       65
    *                                                              REGNST       66
          DO 127 I=2,IFM1                                          REGNST       67
          IF (LAM(I) .GT. SAVLHI(N+NREG)) GO TO 129                L0105048      5
      127 CONTINUE                                                 REGNST       69
          CALL STOPP(" ERROR IN SAVLHI IN REGNST(2)$")             REGNST       70
      129 CONTINUE                                                 REGNST       71
          SAVIHI(2,N)=I                                            REGNST       72
    *                                                              REGNST       73
          DO 130 J=2,JF                                            REGNST       74
          JJ=JF + 2 - J                                            REGNST       75
          IF (PBAR(JJ) .LT. SAVPLO(N)) GO TO 135                   REGNST       76
      130 CONTINUE                                                 REGNST       77
          CALL STOPP(" ERROR IN VALUE OF SAVPLO IN REGNST$")       REGNST       78
      135 CONTINUE                                                 REGNST       79
          SAVPLO(  N+NREG)=SAVPLO(N)                               REGNST       80
          SAVPLO(  N      )=PBAR(JJ)                               REGNST       81
          SAVJLO(1,N      )=JJ                                     REGNST       82
    *                                                              REGNST       83
          JFM1=JF - 1                                              REGNST       84
          DO 137 J=2,JFM1                                          REGNST       85
          JJ=JFM1 + 2 - J                                          REGNST       86
          IF (PHI(JJ) .LT. SAVPLO(N+NREG)) GO TO 139               L0105048      7
      137 CONTINUE                                                 REGNST       88
          CALL STOPP(" ERROR IN VALUE OF SAVPLO IN REGNST(2)$")    REGNST       89
      139 CONTINUE                                                 REGNST       90
          SAVJLO(2,N)=JJ                                           REGNST       91
    *                                                              REGNST       92
          DO 140 J=2,JF                                            REGNST       93
          IF (PBAR(J) .GT. SAVPHI(N)) GO TO 145                    REGNST       94
      140 CONTINUE                                                 REGNST       95
          CALL STOPP(" ERROR IN VALUE OF SAVPHI IN REGNST$")       REGNST       96
      145 CONTINUE                                                 REGNST       97
          SAVPHI(  N+NREG)=SAVPHI(N)                               REGNST       98
          SAVPHI(  N      )=PBAR(J)                                REGNST       99
          SAVJHI(1,N      )=J                                      REGNST      100
    *                                                              REGNST      101
          DO 147 J=2,JFM1                                          REGNST      102
          IF (PHI(J) .GT. SAVPHI(N+NREG)) GO TO 149                L0105048      9
      147 CONTINUE                                                 REGNST      104
          CALL STOPP(" ERROR IN VALUE OF SAVPHI IN REGNST(2)$")    REGNST      105
      149 CONTINUE                                                 REGNST      106
          SAVJHI(2,N)=J                                            REGNST      107
    *                                                              REGNST      108
```

```
 1000 CONTINUE
*
      CONI=57.29578
      PRINT 901
      DO 1010 N=1,NREGON
      P1=SAVLLO(N+NREG) * CONI
      P2=SAVLLO(N     ) * CONI
      P3=SAVLHI(N+NREG) * CONI
      P4=SAVLHI(N     ) * CONI
      P5=SAVPLO(N+NREG) * CONI
      P6=SAVPLO(N     ) * CONI
      P7=SAVPHI(N+NREG) * CONI
      P8=SAVPHI(N     ) * CONI
      PRINT 902,N,P1,P2,SAVILO(1,N)
     * *                 P3,P4,SAVIHI(1,N)
     * *                 P5,P6,SAVJLO(1,N)
     * *                 P7,P8,SAVJHI(1,N)
 1010 CONTINUE
*
  901 FORMAT (///,T30,"*** SAVE REGION SET UP ***",//
     * *"          N",T13 ,"LLO IN",T24 ,"LLO USE",T35 ,"ILO"
     * *                 T43 ,"LHI IN",T54 ,"LHI USE",T65 ,"IHI"
     * *                 T73 ,"PLO IN",T84 ,"PLO USE",T95 ,"JLO"
     * *                 T103,"PHI IN",T114,"PHI USE",T125,"JHI")
  902 FORMAT (4X,I3,2X,4(1X,1PE9.2,1X,1PE12.5,2X,I3,2X))
*
*
      RETURN
      END
```

137 ACTIVE LINE(S)   4 INACTIVE LINE(S)

AE ANDND

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SAS VERSION 5.27    LISTING OF DECK    R H O M B                                       01/12/84          PAGE 1

*** SAS109 : DECK RHOMB     IS EDITED FROM SPL       FILE
CREATED ON 12/20/83 AT 09:59:10           LAST UPDATED ON 12/27/83 AT 17:58:47 BY SAS VERSION 5.27
LANGUAGE:               USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L122783A

          SUBROUTINE RHOMB(A,IA,JA,KA,LA,I1,I2,J1,J2,K1,K2,L1,L2                 RHOMB       1
         * , LU,READ)                                                               RHOMB       2
    *                                                                               RHOMB       3
          DIMENSION A(IA,JA,KA,LA)                                                  RHOMB       4
          LOGICAL READ                                                              RHOMB       5
    *                                                                               RHOMB       6
          IF (.NOT. READ) GO TO 500                                                 RHOMB       7
    *                                                                               RHOMB       8
          READ (LU) (((A(I,J1  ,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                    L122783A    3
          READ (LU) (((A(I,J1+1,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                    L122783A    4
          READ (LU) (((A(I,J2-1,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                    L122783A    5
          READ (LU) (((A(I,J2  ,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                    L122783A    6
    *                                                                               L122783A    7
          READ (LU) (((A(I1  ,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                    L122783A    8
          READ (LU) (((A(I1+1,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                    L122783A    9
          READ (LU) (((A(I2-1,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                    L122783A   10
          READ (LU) (((A(I2  ,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                    L122783A   11
    *                                                                               L122783A   12
          RETURN                                                                    RHOMB      10
    *                                                                               RHOMB      11
      500 CONTINUE                                                                  RHOMB      12
          WRITE (LU) (((A(I,J1  ,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                   RHOMB      13
          WRITE (LU) (((A(I,J1+1,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                   RHOMB      14
          WRITE (LU) (((A(I,J2-1,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                   RHOMB      15
          WRITE (LU) (((A(I,J2  ,K,L),I=I1,I2),K=K1,K2),L=L1,L2)                   RHOMB      16
    *                                                                               RHOMB      17
          WRITE (LU) (((A(I1  ,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                   RHOMB      18
          WRITE (LU) (((A(I1+1,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                   RHOMB      19
          WRITE (LU) (((A(I2-1,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                   RHOMB      20
          WRITE (LU) (((A(I2  ,J,K,L),J=J1,J2),K=K1,K2),L=L1,L2)                   RHOMB      21
    *                                                                               RHOMB      22
          RETURN                                                                    RHOMB      23
          END                                                                       RHOMB      24

          33 ACTIVE LINE(S)            1 INACTIVE LINE(S)

0E SAVREG
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*** SAS109 : DECK SAVREG   IS EDITED FROM SPL      FILE
CREATED ON 12/20/03 AT 09:59:19         LAST UPDATED ON 01/05/04 AT 13:50:45 BY SAS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L010504A  L010504C

            SUBROUTINE SAVREG(ISTP)                                          SAVREG      1
      *                                                                      SAVREG      2
      *     THIS ROUTINE WRITES OUT DATA FOR USE AS INITIAL AND              SAVREG      3
      *       BOUNDARY CONDITIONS FOR A NESTED RUN                           SAVREG      4
      *                                                                      SAVREG      5
      $CALL ALLMAC                                                           SAVREG      6
      *                                                                      SAVREG      7
            IF (NREGON .EQ. 0) RETURN                                        SAVREG      8
      *                                                                      SAVREG      9
            DO 1000 N=1,NREGON                                               SAVREG     10
      *                                                                      SAVREG     11
            IF (ISTP .LT. SAVSTR(N)) GO TO 1000                              SAVREG     12
      *                                                                      SAVREG     13
            I1 =SAVILO(1,N)                                                  SAVREG     14
            I2 =SAVIHI(1,N)                                                  SAVREG     15
            J1 =SAVJLO(1,N)                                                  SAVREG     16
            J2 =SAVJHI(1,N)                                                  SAVREG     17
            II1=SAVILO(2,N)                                                  SAVREG     18
            II2=SAVIHI(2,N)                                                  SAVREG     19
            JJ1=SAVJLO(2,N)                                                  SAVREG     20
            JJ2=SAVJHI(2,N)                                                  SAVREG     21
      *                                                                      SAVREG     22
            LU=70 + N                                                        SAVREG     23
      *                                                                      SAVREG     24
            IF (ISTP .NE. SAVSTR(N)) GO TO 500                               SAVREG     25
      *                                                                      SAVREG     26
      *     SAVE INITIAL DATA                                                SAVREG     27
      *                                                                      SAVREG     28
            WRITE (LU) ((((TAS(I,J,K,L),I=I1,I2),J=J1,J2),K=1,KF),L=1,2)     SAVREG     29
            WRITE (LU) ((ZSUR(I,J),I=I1,I2),J=J1,J2)                         SAVREG     30
      *                                                                      SAVREG     31
            WRITE (LU) ((((USV(I,J,K,L),I=II1,II2),J=JJ1,JJ2),K=1,KF)        SAVREG     32
           . , L=1,2)                                                        SAVREG     33
      *                                                                      SAVREG     34
      *                                                                      SAVREG     35
        500 CONTINUE                                                         SAVREG     36
            IF (MOD(ISTP,SAVINC(N)) .NE. 0) GO TO 1000                       SAVREG     37
      *                                                                      SAVREG     38
            CALL RWBND(TAS,IFP1,JFP1,KF,2,I1,I2,J1,J2,1,KF,1,2               L010504A    3
           . , LU,.FALSE.)                                                   L010504A    4
      *                                                                      L010504A    5
            CALL RWBND(USV,IF,JF,KF,2,II1,II2,JJ1,JJ2,1,KF,1,2               L010504A    6
           . , LU,.FALSE.)                                                   L010504A    7
      *                                                                      L010504A    8
            CALL RWBND(PI,IF,JF,KF,1,I1,I2,J1,J2,1,KF,1,1                    L010504A    9
           . , LU,.FALSE.)                                                   L010504A   10
      *                                                                      L010504A   11
      *     CALL RWBND(ZSUR,IF,JF,1,1,I1,I2,J1,J2,1,1,1,1                    L010504A   12
      *    . , LU,.FALSE.)                                                   L010504A   13
      *                                                                      SAVREG     50
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SAS VERSION 5.27    LISTING OF DECK    S A V R E G                                        01/12/84         PAGE 2

     *      WRITE (LU) REFBN                                                                 L010504C      3
     *      WRITE (LU) (REFBA(I),I=1,REFBN)                                                  L010504C      4
     *                                                                                       SAVREG       53
     *                                                                                       SAVREG       54
      1000 CONTINUE                                                                          SAVREG       55
     *                                                                                       SAVREG       56
     *                                                                                       SAVREG       57
            RETURN                                                                           SAVREG       58
            END                                                                              SAVREG       59

           59 ACTIVE LINE(S)               13 INACTIVE LINE(S)

 GE SETUPA
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*** SMS109 : DECK SETUPA   IS EDITED FROM SPL       FILE
CREATED ON 07/26/79 AT 16:23:26          LAST UPDATED ON 12/05/83 AT 13:40:40 BY SMS VERSION 5.27
LANGUAGE:             USER INFO  ATION:

MODSETS PREVIOUSLY APPLIED TO SPL: FIX211A   FIX211B   FIX215A   FIX215B   FIX221A   FIX225A   FIX226C   FEX226D   F255A
     F255C     F256A     F296D     F298A     F299A     F299B     F303A     F303B     F305A     DMPGPI    UPUIND1   F313A
     DMPGP12   F313B     SLFADJ1   F319A     F319C     PISWEEP4  PISWEEP6  F1206D    F1207A    F1210D    F1212D    F0104A
     F0107A    F0131A    F0204A    F0205A    F0211C    F0211D    F0212C    F0213A    F0214D    F0219A    F0221A    F0222A
     F0225C    F0226D    F0306A    F0310A    F0314B    F0318A    F0319C    F0321C    F0326A    F0326B    F0331A    F0331C
     F0401A    F0403A    F0407C    F0408D    F0409A    F0409C    F0410A    F0410D    F0411A    F0416D    F0417C    F0418A
     F0422C    F0422D    F0430A    F0430D    F0513A    F0515A    F0515D    F0515C    F0530A    F0627D    F0700B    F0723A
     F0723B    F0725C    F0807A    F0812A    F0825B    F1009F    F1020A    F1020E    F1021A    F1023C    F1023E    F0106601A
     F0106601D L0715B1A  L081101E  L081301A  L032302A  L040202A  L040702A  L041302A  L092302A  L072603D  L072703A  L081603A
     L082903C  L120583A

           SUBROUTINE SETUPA(OTH,ICASE)                                                          L081101E      3
      *                                                                                          SETUP         2
      $CALL ALLMAC                                                                               SETUP         3
      *                                                                                          SETUP         4
      $CALL ASTUPC                                                                               F0515A        6
      *                                                                                          SETUP        12
      $CALL AANAML                                                                               L032302A      3
      *                                                                                          L032302A      4
           EQUIVALENCE (IICASE,VARIS)                                                            L032302A      5
      *                                                                                          SETUP        22
           NOIN=.FALSE.                                                                          SETUP        23
           EMPTY=.FALSE.                                                                         SETUP        24
           ILABEL=0                                                                              SETUP        25
           CALL POSITN(1,2)                                                                      F0211C        3
           BACKSPACE 1                                                                           F0211C        4
           BACKSPACE 1                                                                           F0211C        5
           IRUN=0                                                                                F0212C        8
           READ (1,991,END=4) IRUN                                                               F0212C       10
         4 CONTINUE                                                                              F0212C       11
           IRUN=IRUN + 1                                                                         F0211C        7
           CALL S$DATE(DATE,1)                                                                   SETUP        26
           CALL S$TIME(TIME,1)                                                                   SETUP        27
           PRINT 939,IRUN,(DATE(L),L=2,3),(TIME2(L),L=1,2)                                       F0211C        9
       939 FORMAT (1H1,T5,"RUN ",I3,T105,2A4," (",A2,":",A2,")")                                 F0211C       10
         5 CONTINUE                                                                              SETUP        30
           READ (5,930,END=8) MARK,LABEL                                                         SETUP        31
           IF (MARK(1).EQ.AMPER) GO TO 6                                                         SETUP        32
           ILABEL=ILABEL + 1                                                                     SETUP        33
           PRINT 935,MARK,LABEL                                                                  SETUP        34
           IF (RITLOG) GO TO 5                                                                   F0212C       13
           IF (MARK(1).NE.STAR) GO TO 5                                                          F0212C       14
           WRITE(1,991)IRUN,(DATE(L),L=2,3),(TIME2(L),L=1,2),MARK,LABEL                          F0212C       15
       991 FORMAT (I3,1X,2A4,"(",A2,":",A2,") ",2A2,19A4)                                        F0211C       16
           RITLOG=.TRUE.                                                                         F0212C       17
           GO TO 5                                                                               SETUP        35
         6 BACKSPACE 5                                                                           SETUP        36
           GO TO 9                                                                               SETUP        37
         8 CONTINUE                                                                              SETUP        38
           NOIN=.TRUE.                                                                           SETUP        39
           EMPTY=.TRUE.                                                                          SETUP        40
         9 CONTINUE                                                                              SETUP        41
```

```
      IF (.NOT.RITLOG)
     .WRITE(1,991)IRUN,(DATE(L),L=2,3),(TIME2(L),L=1,2)      F0212C    19
  930 FORMAT  (2A2,19A4)                                      F0211C    17
  935 FORMAT (26X,2A2,19A4)                                   SETUP     42
  940 FORMAT (2A2)                                            SETUP     43
*                                                             SETUP     44
*     SET DEFAULT VALUES                                      SETUP     45
*                                                             SETUP     46
      AINV=1.5695E-7                                          SETUP     47
      CG=0.1E0                                                SETUP     48
      RC=.23E0                                                SETUP     49
      LSQ=10.E0                                               SETUP     50
      LSQ=LSQ * LSQ                                           SETUP     51
      RHO0=1.0281045E0                                        SETUP     52
      G=9.8E0                                                 SETUP     53
      GSURF=9.8E0                                             SETUP     54
      BETAH=1.5E0                                             F0107A     6
      BETAV=1.3E0                                             SETUP     55
      CV=1.E-4                                                SETUP     56
      ZV=1.E2                                                 SETUP     57
      DELT=20.E0                                              SETUP     58
      CD=3.E-3                                                SETUP     59
      SURFA=0.                                                SETUP     60
      RARO=1.21E-3                                            F0430A     5
      FIXZS=.TRUE.                                            SETUP     62
      FIXINT=.TRUE.                                           SETUP     63
      ADBZS=1.                                                SETUP     64
      ADBINT=1.                                               SETUP     65
      FIXTS=.TRUE.                                            SETUP     66
      VFIXTS=.TRUE.                                           SETUP     67
      THTSLA=.5E0                                             F1023E     5
      THTSPA=.5E0                                             FIX211A    7
      THTSSA=.5E0                                             FIX211A    8
      THTSLD=1.E0                                             FIX211A    9
      THTSPD=1.E0                                             FIX211B    4
      THTSSD=1.E0                                             FIX211B    5
      FIXUV=.TRUE.                                            FIX211B    6
      VFIXUV=.TRUE.                                           SETUP     71
      THUVLA=.5E0                                             SETUP     72
      THUVPA=.5E0                                             FIX211A   14
      THUVSA=.5E0                                             FIX211A   15
      THUVLD=4.E0                                             FIX211A   16
      THUVPD=4.E0                                             FIX211B    8
      THUVSD=.5E0                                             FIX211B    9
      THUVF=.5                                                FIX211A   19
      TMAX=27.                                                F0225C     3
      TIMMN=0                                                 SETUP     77
      SALT=1.E0                                               F0326A     9
      UMAX=10.E0                                              SETUP     79
      DT=600.E0                                               SETUP     80
      HOUR=0.                                                 SETUP     85
      NSTEP=0                                                 SETUP     86
      OMEGA=7.292166E-5                                       F0225C     5
      F0=1.458433E-5                                          SETUP     88
      CASE=1                                                  SETUP     89
      SMOOTH=.FALSE.                                          SETUP     90
      KS=1.5                                                  F290A      9
      ZSM=2000.                                               F290A     10
                                                              F290A     11
```

```
      NBATTN=500.                                          DAPGPI2     6
      DTMULT=1.                                            DAPGPI      6
      DTMAX=0.                                             DAPGPI      7
      DAPGPI=.FALSE.                                       DAPGPI      8
      AUPUNO=0.                                            F0409C      3
      ASMZSN=+100.00                                       F0409C      4
      OLDPI=.TRUE.                                         F1020A      6
      DPPII=0.2                                            F1212B      3
      DAPPII=.TRUE.                                        F1207A      6
      NGAPPT=6                                             F0104A      6
      NZSITR=15                                            F0306A      6
      ZSFERR=0.                                            F0204A      6
      ZSFCHK=0                                             F0205A      6
      CJCOEF=.5                                            F0306A      8
*          DECS=-9936722221   INCS=-9007375661             F0306A     10
*          DEC_=-9936723041   INC_=-9007377281             F0306A     11
      OJCOEF=-900737566                                    F0306A     12
      ZSINI=0                                              F0214B      7
      CZSINI=1.E-4                                         F0326A     11
      ZSINMN=22                                            F0326A     12
      ZSFLCR=1.E20                                         F0306A     14
      ZSFA=100.                                            F0226B      7
      VVFDIV=.TRUE.                                        F0306A     16
      REFOR=10                                             F0314B      8
      REFBF=100000                                         F0319C      6
      DELTTS=.FALSE.                                       F0400B      8
      NPPAGE=2                                             F0400B      9
      REFBR=2.300                                          F0417C      6
      QRMULT=1.                                            F0430B      6
      TINDEP=200.                                          F0513A      6
      IFNITR=10                                            F0627B      6
      FIA=100.                                             F0627B      7
      FIERR=.1                                             F0627B      8
      KVR=5.E4                                             F0007A      6
      BOTCHK=200.                                          F0700B      5
      FICHK=0                                              F0700B      6
      UNAXN=.1                                             F0725C      6
      FORCIN=.FALSE.                                       F1020A      8
      FTATCH=.TRUE.                                        F1021A      6
      CONDEN=.FALSE.                                       L001301A    5
      CKN=0.                                               L001603A    3
      ZCKN=1.E6                                            L001603A    4
      DO 12 I=1,4                                          L001603A    5
   12 FLUXIN(I)=0.                                         L001603A    6
      DINFL=100.                                           L001603A    7
      DBOTBL=1.E3                                          L001603A    8
      NREGON=0                                             L120503A    3
*                                                          FIX215A     6
*     GET BOTTOM DATA                                      FIX215A     7
*                                                          FIX215A     8
      READ (2,910) LMIN,LMAX,PMIN,PMAX,IFC,JFC,XLSPAC,XPSPAC  L092302A 3
  910 FORMAT (4F7.1,2I7,1P2E10.3)                          L092302A    4
      IF (IF.NE.IFC  .OR.  JF.NE.JFC)                      FIX215A    11
     .CALL STOPP(' ERROR IN SETUP, WRONG VALUE OF IF OR JF RETURNED FROM  FIX215A 12
     . FILE 26')                                           FIX215A    13
      XLMIN=- LMIN                                         FIX215A    14
      PRINT 919,LMIN,LMAX,PMIN,PMAX                        F303A       7
  919 FORMAT (///,' THE DOMAIN RUNS FROM ',F8.3            F0411A      3
```

```
        . , " DEGREES EAST TO ",F8.3," DEGREES EAST, AND "          F0411A      4
        . , F8.3," DEGREES NORTH TO ",F8.3," DEGREES NORTH.")       F0411A      5
          DO 15 I=1,IF                                              FIX2150     3
       15 READ (2,920)(ZBOT(I,J),J=1,JF)                            F0331A      5
    *                                                               L002903C    3
    *     ZBOT WILL EVENTUALLY (IN SETUPB) BE BARRED WRT I AND J, SO L002903C   4
    *       WE NEED TO SAVE ZBOT AT THE ORIGINAL LOCATIONS (MM-)    L002903C    5
    *                                                               L002903C    6
          DO 16 J=1,JF                                              L002903C    7
          DO 16 I=1,IF                                              L002903C    8
       16 ZBOTMM(I,J)=ZBOT(I,J)                                     L002903C    9
      920 FORMAT (10F7.1)                                           F1009F      3
          DO 10 I=1,3                                               F299A       5
          DO 10 J=1,40                                              F299A       6
       10 IPC(I,J)=1                                                F299A       7
          DO 20 II=1,60                                             F299A       8
       20 PC(II)=-1                                                 SETUP      99
    *                                                               SETUP     100
    *                                                               SETUP     101
          IF (MARK(2).NE.ON     .OR.   NOIN) GO TO 30               SETUP     102
          READ (5,ONE)                                              SETUP     103
          READ(5,940,END=25) MARK                                   SETUP     104
          BACKSPACE 5                                               SETUP     105
          GO TO 30                                                  SETUP     106
       25 NOIN=.TRUE.                                               SETUP     107
       30 CONTINUE                                                  SETUP     108
          IF (MARK(2).NE.TW   .OR.   NOIN) GO TO 50                 F299B       6
          READ (5,TWO)                                              F299B       7
          READ (5,940,END=45) MARK                                  F299B       8
          BACKSPACE 5                                               F299B       9
          GO TO 50                                                  F299B      10
       45 NOIN=.TRUE.                                               F299B      11
       50 CONTINUE                                                  F299B      12
          IF (HOUR.NE.0) DT=HOUR * 3600.                            SETUP     109
          IF (PC(1).LT.0) PC(1)=NSTEP                               SETUP     117
          IF (PC(6).LT.0) PC(6)=NSTEP                               SETUP     118
          IF (PC(9).LT.0) PC(9)=NSTEP                               SETUP     119
          IF (PC(12).LE.0) PC(12)=0                                 F255A       3
          IF (PC(13).LT.0) PC(13)=0                                 SETUP     120
          IF (PC(14).LT.0) PC(14)=0                                 SETUP     121
          IF (PC(17).LT.0) PC(17)=0                                 F255A       5
          IF (PC(18).LT.0) PC(18)=0                                 F255A       6
          IF (PC(25).LT.0) PC(25)=1                                 F05150      3
          IF (PC(26).LT.0) PC(26)=1                                 F05150      4
          IF (PC(27).LT.0) PC(27)=1                                 F05150      5
          IF (PC(28).LT.0) PC(28)=0                                 F05150      6
          IF (PC(29).LT.0) PC(29)=0                                 F05150      7
          IF (PC(31).LT.0) PC(31)=0                                 F0012A      3
          IF (PC(33).LT.0) PC(33)=0                                 F00250      3
          IF (PC(38).EQ.0 .AND. PC(39).EQ.0) GO TO 60               L072703A    3
          IF (.NOT.OLDPI) CALL STOPP                                L072703A    4
        .(" GEOSTROPHIC VELOCITY ONLY IF  OLDPI=T .. SETUPA6")      L072703A    5
          IF (    DMPGPI) CALL STOPP                                L072703A    6
        .(" GEOSTROPHIC VELOCITY ONLY IF DMPGPI=F .. SETUPA6")      L072703A    7
       60 CONTINUE                                                  L072703A    8
    *                                                               F0310A      5
    *     IF BAROTROPIC CASE                                        F0310A      6
    *                                                               F0310A      7
```

```
213          IF (G.EQ.0.)                                 F0310A      8
214         .CALL S$JSLV(1,1,1,1,CB,I)                    F0310A      9
215          LASTEP=999                                   L041302A    3
216          DO 40 II=1,60                                F299A      10
217       40 IF (PC(II) .LT. 0) PC(II)=LASTEP             L041302A    5
218          CALL PPARAM(DT)                              L040702A    3
219     *                                                 F0515A      8
220          DTX=DT                                       F0515A      9
221          ICASE=CASE                                   L081101E    5
222          IICASE=CASE                                  L032302A    9
223     *                                                 F0515A     10
224     *    DO SETUP PART B NEXT                         F0515A     11
225     *                                                 F0515A     12
226          RETURN                                       F0515A     13
227          END                                          F0515A     14

           230 ACTIVE LINE(S)           296 INACTIVE LINE(S)

DE SETUPB
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*** SAS109 : DECK SETUPB   IS EDITED FROM SPL      FILE
CREATED ON 05/15/80 AT 08:40:13          LAST UPDATED ON 12/20/83 AT 09:59:21 BY SAS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F0515B    F0515D    F0720F    F1020A    F1023C    F1223B    F010681A  F010781A  L071501A
     L072001B  L092382A  L033103A  L001603A  L001603D  L120503A  L120503B  L120603B  L122003A

          SUBROUTINE SETUPB(DT)                                                          F1020A        3
      *                                                                                  SETUPB        2
      $CALL ALLMAC                                                                       SETUPB        3
      $CALL ASTUPC                                                                       SETUPB        4
      *                                                                                  F0515B        3
          DIMENSION DUMK(IF,JF,KF),DUMIJK(IF,JF,KF)                                      F0515B        4
          REAL*4 LBAR(IFP1),PBAR(JFP1)                                                   L120503A      3
          EQUIVALENCE (DUMK,KV),(DUMIJK,KM)                                              F0515B        5
          EQUIVALENCE (LBAR,B2),(PBAR,B1)                                                L120503A      5
      *                                                                                  F1020A        5
          NAMELIST/MINE/PHI,LAM,F,UAGVA,SURF,QR,ZBOT                                     F1020A        6
         * , ZSUR,FS,REFBA                                                               F1020A        7
      *                                                                                  SETUPB        5
          ITEST=0                                                                        SETUPB        6
          DO 56 J=1,40                                                                   SETUPB        7
          DO 52 I=1,3                                                                    SETUPB        8
          IF (IPC(I,J).NE.1) GO TO 54                                                    SETUPB        9
       52 CONTINUE                                                                       SETUPB       10
          GO TO 56                                                                       SETUPB       11
       54 ITEST=ITEST + 1                                                                SETUPB       12
          IF (ITEST.EQ.1) PRINT 900                                                      SETUPB       13
          PRINT 901,J,(IPC(II,J),II=1,3)                                                 SETUPB       14
       56 CONTINUE                                                                       SETUPB       15
      900 FORMAT (1H0,5X,"PRINT INCREMENT CONTROLS",/)                                   SETUPB       16
      901 FORMAT (5X, "IPC(1," ,I2, ")=(" ,I3, "," ,I2, "," ,I2,")")                     F0720F        3
      *                                                                                  SETUPB       18
      *                                                                                  SETUPB       19
          IF (PC(14).EQ.0)                                                               SETUPB       20
         .CALL PRT(-1," BOTTOM DEPTH   ",ZBOT,IF,JF,1,1,.FALSE.                          SETUPB       21
         * , IPC(1,14))                                                                  SETUPB       22
      *                                                                                  SETUPB       23
      * *** HERE, IF REQUESTED, THE INPUT BOTTOM TOPOGRAPHY CAN BE SMOOTHED **           SETUPB       24
      *                                                                                  SETUPB       25
          IF (.NOT.SMOOTH) GO TO 58                                                      SETUPB       26
          CALL ZSMUTH(KS,ZSM,ZBOT,D3,D4,IF,JF                                            SETUPB       27
         * , ZTOTS,ZTOTE,ZMAXX,NTT,DTT,TTAU)                                             SETUPB       28
          PRINT 950,ZTOTS                                                                SETUPB       29
      950 FORMAT (1H0," THE SUM OF THE INTERIOR DEPTHS BEFORE IS",1PE10.3)               SETUPB       30
          PRINT 951,KS,ZSM,ZMAXX,NTT,DTT,TTAU                                            SETUPB       31
      951 FORMAT (1H0," KS= ",F3.1,5X,"ZSMOOTH= ",F7.1,5X                                SETUPB       32
         * ,"ZMAX= ",F7.1,5X,"NT= ",I4,5X,"DT= ",1PE9.2                                  SETUPB       33
         * , 5X,"TAU= ",1PE9.2)                                                          SETUPB       34
          PRINT 952,ZTOTE                                                                SETUPB       35
      952 FORMAT(1H0," THE SUM OF THE INTERIOR DEPTHS AFTER IS ",1PE10.3,/)              SETUPB       36
          CALL PRT(-1," SMOOTHED DEPTHS",ZBOT,IF,JF,1,1,.FALSE.                          SETUPB       37
         * , IPC(1,14))                                                                  SETUPB       38
       58 CONTINUE                                                                       SETUPB       39
      *                                                                                  SETUPB       40
      * *** SET UP MESH ****************************************************             SETUPB       41
```

```
      *                                                                  SETUPB      42
      *    REMEMBER THE LATERAL BOUNDARIES LIE BETWEEN MESH LINES (IE.   SETUPB      43
      *      THERE IS ALWAYS A ROW OF MESH POINTS OUTSIDE THE BOUNDARY). SETUPB      44
      *      HENCE, THE FACTORS OF 1.5 (RATHER THAN 1) BELOW.            SETUPB      45
      *                                                                  SETUPB      46
           CON=1.745329E-2                                               SETUPB      49
           PRINT 960                                                     L092302A     4
           CALL MESHST(PHI,JF,PMIN,PMAX,XPSPAC,0)                        L092302A     5
           DO 60 J=1,JF                                                  SETUPB      51
        60 PHI(J)=PHI(J) * CON                                           SETUPB      53
           PRINT 961                                                     L092302A     8
           CALL MESHST(LAM,IF,LMIN,LMAX,XLSPAC,0)                        L092302A     9
           DO 70 I=1,IF                                                  SETUPB      55
        70 LAM(I)=LAM(I) * CON                                           SETUPB      57
           DEL=PHI(2) - PHI(1)                                           L092302A    12
           DO 75 J=3,JF                                                  L092302A    13
           DELCHK=PHI(J) - PHI(J-1)                                      L092302A    14
           IF (DELCHK .LT. DEL) DEL=DELCHK                               L092302A    15
        75 CONTINUE                                                      L092302A    16
      *                                                                  L120503B     3
           DO 76 N=1,NREGON                                              L120503B     4
           SAVPLO(N)=SAVPLO(N) * CON                                     L120503B     5
           SAVPHI(N)=SAVPHI(N) * CON                                     L120503B     6
           SAVLLO(N)=SAVLLO(N) * CON                                     L120503B     7
           SAVLHI(N)=SAVLHI(N) * CON                                     L120503B     8
        76 CONTINUE                                                      L120503B     9
           DEL=CON * DEL / AINV                                          L092302A    17
      *                                                                  SETUPB      58
           DO 80 I=1,IF                                                  SETUPB      59
           DO 80 J=1,JF                                                  SETUPB      60
        80 F(I,J)=2.E0 * OMEGA * SIN(PHI(J))                             SETUPB      61
      *                                                                  L072001B     3
      *    SET UP Z BAR K AND Z BAR IJK IN RV-RN ARRAY SPACE.  THEY      L072001B     4
      *      MAY BE USED IN CASE ROUTINES                                L072001B     5
      *                                                                  L072001B     6
           CALL DEPINI                                                   L072001B     7
      *                                                                  L120503A     7
      *    SET UP THE SUBREGIONS, IF NECESSARY                           L120503A     8
      *                                                                  L120503A     9
           IF (NREGON .EQ. 0) GO TO 78                                   L120503A    10
           CALL REGNST(PHI,LAM,D1,D2,SAVPLO,SAVPHI,SAVLLO,SAVLHI         L120503A    11
          . , SAVILO,SAVIHI,SAVJLO,SAVJHI,IF,JF,IFP1,JFP1,NREGON,NREG)   L120503A    12
      *                                                                  L120503A    13
           DO 77 N=1,NREGON                                              L120503A    14
      *                                                                  L120503A    15
           LU=N + 70                                                     L120503A    16
           KFU=KF                                                        L120503A    17
           I1 =SAVILO(1,N)                                               L122003A     4
           I2 =SAVIHI(1,N)                                               L122003A     5
           J1 =SAVJLO(1,N)                                               L122003A     6
           J2 =SAVJHI(1,N)                                               L122003A     7
      *                                                                  L122003A     8
           II1=SAVILO(2,N)                                               L122003A     9
           II2=SAVIHI(2,N)                                               L122003A    10
           JJ1=SAVJLO(2,N)                                               L122003A    11
           JJ2=SAVJHI(2,N)                                               L122003A    12
      *                                                                  L122003A    13
           NI1= I2 -  I1 + 1                                             L122003A    14
```

```
        NJ1= J2 - J1 + 1                                              L122003A  15
        NI2=II2 - II1 + 1                                             L122003A  16
        NJ2=JJ2 - JJ1 + 1                                             L122003A  17
*                                                                     L120503A  27
        WRITE (LU) IRUN,N                                             L120503A  28
        WRITE (LU) SAVSTR(N),SAVINC(N),SAVPLO(N),SAVPHI(N)            L120503A  29
     * .             SAVLLO(N),SAVLHI(N)                              L120503A  30
        WRITE (LU) NI1,NJ1,NI2,NJ2,KFM,DT                             L122003A  19
        WRITE (LU) (LBAR(I),I= I1, I2)                                L122003A  21
     * .           (PBAR(J),J= J1, J2)                                L122003A  22
     * .           ( LAM(I),I=II1,II2)                                L122003A  23
     * .           ( PHI(J),J=JJ1,JJ2)                                L122003A  24
        WRITE (LU) FIXZS ,ADDZS ,ZSFA,ZSFERR,NZSITR                   L120503A  36
     * .           FIXINT,ADDINT,FIA ,FIERR ,IFNITR                   L120503A  37
        WRITE (LU) ((ZDOT(I,J),I=II1,II2)                             L122003A  26
     * .                           J=JJ1,JJ2)                         L122003A  27
        IF (I1.LT.2 .OR. I2.GT.IF  .OR.  J1.LT.2 .OR. J2.GT.JF)       L120503A  40
       .CALL STOPP(" SUBREGION NOT IN INTERIOR ... SETUPB$")          L120503A  41
        WRITE (LU) (((DUMIJK(I,J,K),I= I1, I2),J= J1, J2),K=2,KFM1)   L122003A  29
        WRITE (LU) (((DUMK  (I,J,K),I=II1,II2),J=JJ1,JJ2),K=2,KFM1)   L122003A  30
*                                                                     L120503A  44
    77 CONTINUE                                                       L120503A  45
C                                                                     L120503A  46
    78 CONTINUE                                                       L120503A  47
*                                                                     SETUPB    62
* *** CALL SPECIFIC INPUT ROUTINE ************************************ SETUPB    63
*                                                                     SETUPB    64
*                 1    2    3    4    5    6    7    8                L120503A  49
        GO TO (100, 90,120,130,140,145,150,152),CASE                  L120503A  50
    90 CONTINUE                                                       L071501A   5
        CALL STOPP("BAD VALUE OF CASE$")                              F1020A    10
   100 CALL CASE1(TINAN,TMAX,SALT)                                    F1023C     3
        GO TO 160                                                     F1020A    12
   120 CALL CASE3(DT)                                                 F1020A    15
        GO TO 160                                                     F1020A    16
   130 CALL CASE4(TMAX,DT)                                            F010701A   3
        GO TO 160                                                     F1020A    18
   140 CALL CASE5                                                     F1020A    19
        GO TO 160                                                     L033103A   6
   145 CALL CASE6                                                     L033103A   7
        GO TO 160                                                     L033103A   8
   150 CALL CASE7                                                     L033103A   9
        GO TO 160                                                     L120503A  52
   152 CALL CASE8                                                     L120603B   3
   160 CONTINUE                                                       F1020A    22
*                                                                     F05150     7
*       OPTIONAL PRINTS    Z BAR K    AND    Z BAR IJK                L072001B   9
*                                                                     F05150     9
        IF (PC(26).EQ.0)                                              F05150    10
       .CALL PRT(0,"Z BAR K$",DUMK,IF,JF,KFM1,1,.TRUE.,IPC(1,26))     F05150     4
        IF (PC(27).EQ.0)                                              F05150    12
       .CALL PRT(0,"Z BAR IJK$",DUMIJK,IF,JF,KFM1,1,.TRUE.,IPC(1,27)) F05150     6
*                                                                     SETUPB    71
*                                                                     SETUPB    72
* *** SET UP SOME OF THE ARRAYS REQUIRED IN THE CALCULATION ********** SETUPB    73
*                                                                     SETUPB    74
*       FIND ARRAY USED IN CALCULATION OF DEPTHS AT SIGMA LEVELS      SETUPB    75
*                                                                     SETUPB    76
```

```
      DELTI=1. / DELT
      DO 185 J=1,JF
      DO 185 I=1,IF
  185 ZSAV(I,J)=ZBOT(I,J) * DELTI   +   1.
*
*     FIND Z BAR IJ
*
      DO 190 I=2,IF
      DO 190 J=1,JF
  190 D3(I,J)=ZBOT(I,J) + ZBOT(I-1,J)
*
      DO 195 I=1,IF
      DO 195 J=1,JF
  195 DUM(I,J)=0.
*
      DO 200 I=2,IF
      DO 200 J=2,JF
  200 DUM(I,J)=(D3(I,J) + D3(I,J-1)) * .25E0
*
      DO 205 J=2,JF
  205 DUM(1,J)=DUM(3,J)
*
      DO 210 I=1,IF
  210 DUM(I,1)=DUM(I,3)
*
*     FIND QUANTITY THAT IS REQUIRED IN ROUTINE ZGRPIE
*
      DELTI=1. / DELT
      DO 215 J=1,JF
      DO 215 I=1,IF
  215 D3(I,J)=DUM(I,J) * DELTI
*
      DO 220 J=1,JF
      DO 220 I=1,IF
  220 D3(I,J)=D3(I,J) + 1.
*
      DO 225 J=1,JF
      DO 225 I=1,IF
  225 D3(I,J)=ALOG(D3(I,J))
*
      DO 230 J=1,JF
      DO 230 I=1,IF
  230 ZDPIF(I,J)=1. / D3(I,J)
*
*     FIND QUANTITY THAT IS REQUIRED IN ROUTINE UVDOTB
*
*
      CON1=(-1. / HEATTH**4) * .125
      DO 235 J=2,JFM1
      DO 235 I=2,IFM1
      GRADZB(I,J)=AMAX1(DUM(I,J),DUM(I+1,J),DUM(I,J+1),DUM(I+1,J+1))
      ZWORK      =AMIN1(DUM(I,J),DUM(I+1,J),DUM(I,J+1),DUM(I+1,J+1))
      GRADZB(I,J)=GRADZB(I,J) - ZWORK
  235 GRADZB(I,J)=GRADZB(I,J) * CON1
*
*     BOTTOM TOPOGRAPHY IS SYMMETRIC
*
      DO 240 J=2,JFM1
```

```
      GRADZB(1,J)=GRADZB(2,J)
  240 GRADZB(IF,J)=GRADZB(IFM1,J)
*
      DO 245 I=1,IF
      GRADZB(I,1)=GRADZB(I,2)
  245 GRADZB(I,JF)=GRADZB(I,JFM1)
*
*     FIND THE MODIFIED DEPTH VALUES THAT WILL BE USED IN PISURF
*       FOR THE ZS STABILIZATION.
*
      IF (.NOT.DNPGPI) GO TO 257
      CONN=-0.
      DO 250 J=1,JF
      DO 250 I=1,IF
  250 D10(I,J)=GRADZB(I,J) * CONN
*
*     NEGATIVE 1/3 TO INVERT THE EXPRESSION
*
      CON3=-1. / 3.
      CALL RAISE(D9,D10,CON3,1,IF,1,JF,IFP1,JFP1,IFP1,JFP1)
*
      DO 255 J=1,JF
      DO 255 I=1,IF
  255 D10(I,J)=AMIN1(ZBOT(I,J),D9(I,J))
*
      CALL SMZSH(D10,IFP1,JFP1,ASMZSH,ZSH,IF,JF,D9,IFP1,JFP1)
      GO TO 258
  257 CALL SMZSH(ZBOT,IF,JF,ASMZSH,ZSH,IF,JF,D9,IFP1,JFP1)
  258 CONTINUE
      IF (ASMZSH.LE.0.)
     .CALL PRT(-1,'SMOOTHED ZS (FOR FIXING) DEPTHS',ZSH,IF,JF,1,2
     . , .FALSE.,0)
*
*     THE DEPTH (Z-B BAR IJ) IS NEEDED IN THE SURFACE FIXING
*
      DO 260 J=2,JF
      DO 260 I=1,IF
  260 D3(I,J)=ZBOT(I,J) + ZBOT(I,J-1)
*
      DO 263 J=2,JF
      DO 263 I=2,IF
  263 ZBOT(I,J)=(D3(I-1,J) + D3(I,J)) * .25
*
      DO 265 J=1,JF
      DO 265 I=1,IF
      FS(I,J)=0.
  265 CONTINUE
*
*     INITIALIZE Z SURFACE
*
      I=IABS(ZSINI)
      CALL ZSSET(ZSUR,IF,JF,I,CZSINI,ZSINNN)
      IF (ZSINI.GT.0)
     .CALL ZSPRT(-1,'INITIALIZED SURFACE VALUES IN METERS',ZSUR
     . , IF,JF,.FALSE.,9,D4)
*
*     READ IN COEFFICIENTS TO BE USED IN REFERENCE BUOYANCY
*
```

```
      IF (REFBN.EQ.0) GO TO 267                                         SETUP8   193
      READ (4) ITEST                                                    SETUP8   194
      IF (ITEST.NE.REFBN) GO TO 266                                     SETUP8   195
      READ (4) (REFBA(I),I=1,REFBN)                                     SETUP8   196
      GO TO 267                                                         SETUP8   197
  266 CONTINUE                                                          SETUP8   198
      DO 269 I=1,REFBN                                                  SETUP8   199
  269 REFBA(I)=0.D0                                                     SETUP8   200
      PRINT 901                                                         SETUP8   201
  901 FORMAT (//,2(" *****",/)                                          SETUP8   202
     . ," ***** WARNING:  REFBN DOES NOT MATCH VALUE FROM INPUT"        SETUP8   203
     . ," DISK FILE.  ALL COEFFICIENTS WILL BE SET TO ZERO.",/          SETUP8   204
     . ,2(" *****",/))                                                  SETUP8   205
  267 CONTINUE                                                          SETUP8   206
C                                                                       SETUP8   207
C     ZERO OUT RHO SO THAT MAX VALUES CAN BE PICKED OUT BY QCHECK       SETUP8   208
C                                                                       SETUP8   209
      DO 260 K=2,KFR1                                                   SETUP8   210
      DO 260 J=1,JF                                                     SETUP8   211
      DO 260 I=1,IF                                                     SETUP8   212
  260 RHO(I,J,K)=0.                                                     SETUP8   213
C                                                                       SETUP8   214
C ***                                                         ***       SETUP8   215
C                                                                       SETUP8   216
      IF (PC(15).NE.0) GO TO 270                                        SETUP8   217
      CALL PRT(-1,"     Z BAR IJ     ",DUM,IF,JF,1,1,.FALSE.            SETUP8   218
     . , IPC(1,15))                                                     SETUP8   219
  270 CONTINUE                                                          SETUP8   220
      IF (PC(16) .NE. 0) GO TO 280                                      SETUP8   221
      DELTI=1. / DELT                                                   SETUP8   222
      DO 275 J=2,JF                                                     SETUP8   223
      DO 275 I=2,IF                                                     SETUP8   224
  275 DUM(I,J)=DUM(I,J) * DELTI                                         SETUP8   225
      CALL TXSURF(TSS,TS,D3,D4,IFP1,JFP1,KF,DUM,IF,JF,0)                SETUP8   226
      CALL PRT(-1," INIT SURF TEMP ",TS,IFP1,JFP1,1,1,.FALSE.           SETUP8   227
     . , IPC(1,16))                                                     SETUP8   228
  280 CONTINUE                                                          SETUP8   229
C                                                                       SETUP8   230
C                                                                       F1020A    24
C     SURF ARRAY CAN BE SET IN ROUTINE FORCE                            F1020A    25
C                                                                       F1020A    26
      IF (FORCIN) GO TO 290                                             F1020A    27
C                                                                       SETUP8   231
C     SET SURFACE BOUNDARY CONDITION ARRAY.  WHAT IT REPRESENTS         SETUP8   232
C       DEPENDS ON THE VALUE OF SURFA:                                  SETUP8   233
C           SURFA=0          SURFACE FLUX OF HEAT SET TO ZERO           SETUP8   234
C           SURFA > 1.E10    SURFACE TEMPERATURE IMPOSED                SETUP8   235
C           SURFA OTHERWISE  MIXED CONDITION                            SETUP8   236
C     (NOTE THAT TSURF INITIAL IS JUST T(2))                            SETUP8   237
C                                                                       SETUP8   238
      IF (SURFA.NE.0.) GO TO 285                                        SETUP8   239
      DO 283 J=2,JF                                                     SETUP8   240
      DO 283 I=2,IF                                                     SETUP8   241
  283 SURF(I,J)=0.                                                      SETUP8   242
      GO TO 290                                                         SETUP8   243
C                                                                       SETUP8   244
  285 CONTINUE                                                          SETUP8   245
      DO 289 J=2,JF                                                     SETUP8   246
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      DO 289 I=2,IF                                        SETUPB    247
  289 SURF(I,J)=TSS(I,J,2,1)                               SETUPB    248
      IF (SURFA.GE.1.E10) GO TO 290                        SETUPB    249
C                                                          SETUPB    250
      SURFAI=1. / SURFA                                    SETUPB    251
      DO 292 J=2,JF                                        SETUPB    252
      DO 292 I=2,IF                                        SETUPB    253
  292 DS(I,J)=QR(I,J) * SURFAI                             SETUPB    254
C                                                          SETUPB    255
      DO 295 J=2,JF                                        SETUPB    256
      DO 295 I=2,IF                                        SETUPB    257
  295 SURF(I,J)=SURF(I,J) - DS(I,J)                        SETUPB    258
C                                                          SETUPB    259
  290 CONTINUE                                             SETUPB    260
C                                                          SETUPB    261
      IF (MARK(2).NE.NI   .OR.   NOIN) GO TO 310           SETUPB    262
      READ (5,NINE)                                        SETUPB    263
      READ (5,940,END=310) MARK                            SETUPB    264
      BACKSPACE 5                                          SETUPB    265
      GO TO 310                                            SETUPB    266
  305 NOIN=.TRUE.                                          SETUPB    267
  310 CONTINUE                                             SETUPB    268
      IF (PC(11).EQ.0) WRITE (6,NINE)                      SETUPB    269
C                                                          SETUPB    270
C     SET PISUR BASED ON INITIAL ZSUR                      SETUPB    271
C                                                          SETUPB    272
      X=-GSURF                                             SETUPB    273
      DO 312 J=2,JF                                        SETUPB    274
      DO 312 I=2,IF                                        SETUPB    275
  312 PISUR(I,J)=ZSUR(I,J) * X                             SETUPB    276
C                                                          SETUPB    277
      PRINT 946                                            SETUPB    278
  946 FORMAT (//,' THE INPUT DATA APPEARS AS FOLLOWS:',/)  SETUPB    279
      REWIND 5                                             SETUPB    280
      IF (.NOT.EMPTY) GO TO 315                            SETUPB    281
      PRINT 947                                            SETUPB    282
      PRINT 947                                            SETUPB    283
  947 FORMAT (//,' THERE IS NO INPUT DATA FOR THIS RUN')   SETUPB    284
      RETURN                                               SETUPB    285
  315 CONTINUE                                             SETUPB    286
      IF (ILABEL.EQ.0) GO TO 330                           SETUPB    287
      DO 300 LL=1,ILABEL                                   SETUPB    288
  300 READ 930,MARK,LABEL                                  SETUPB    289
  330 CONTINUE                                             SETUPB    290
  320 READ (5,945,END=350) LABEL                           SETUPB    291
      PRINT 945,LABEL                                      SETUPB    292
      GO TO 320                                            SETUPB    293
  350 CONTINUE                                             SETUPB    294
  945 FORMAT (19A4)                                        SETUPB    295
  930 FORMAT (2A2,19A4)                                    SETUPB    296
  940 FORMAT (2A2)                                         SETUPB    297
  960 FORMAT (20X,'LATITUDE MESH:')                        L092302A   19
  961 FORMAT (20X,'LONGITUDE MESH:')                       L092302A   20
C                                                          SETUPB    298
      RETURN                                               SETUPB    299
      END                                                  SETUPB    300
```

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SAS VERSION 5.27    LISTING OF DECK    S E T U P B                                        01/12/84          PAGE 8
                    395 ACTIVE LINE(S)            54 INACTIVE LINE(S)

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*** SMS189 : DECK UVBND    IS EDITED FROM SPL      FILE
CREATED ON 06/18/79 AT 13:46:32          LAST UPDATED ON 02/13/84 AT 13:18:33 BY SMS VERSION 5.27
LANGUAGE: FORTRAN      USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: FIX200A   FIX201A   FIX201F   F292A    PISWEEP1  F0428B   F0530A   F1024D   F1027C
     F011281A  F011281B  L032382A  L081683A  L081883B  L082983B  L010484A  L020384A  L021384B

          SUBROUTINE UVBND                                                          UVBND      1
     *                                                                              UVBND      2
     *    THIS ROUTINE SETS THE EXTRA UV POINTS WHICH LIE OUTSIDE THE              UVBND      3
     *      BOUNDARY.                                                               UVBND      4
     *                                                                              UVBND      5
     $CALL ALLMAC                                                                   UVBND      6
     *                                                                              UVBND      7
          DIMENSION D12(IFP1,JFP1,2)                                                F292A      3
          EQUIVALENCE (D12,D5)                                                      UVBND      9
        . , (CASE,VAR15)                                                            L032382A   4
          EQUIVALENCE (ISTP,VAR14)                                                  L081683A   3
          INTEGER CASE                                                              L010484A   3
     *                                                                              UVBND     10
     *    DO THE BOTTOM ACCORDING TO EQN. 3.34 (INTERIOR LATERAL POINTS).           UVBND     11
     *                                                                              UVBND     12
     *    IF THE VERTICAL FIXING WAS DONE, THEN THE QUANTITY THAT                   FIX200A    7
     *      WE CALCULATE IN DBTM WOULD HAVE BEEN PLACED IN D9.                      FIX201A    6
     *    IT IS BASED ON THE OLD UV'S, NOT THE UPDATED ONES.                        F0428B     3
     *      THEREFORE, DBTM MUST BE CALLED AGAIN.                                   F0428B     4
     *                                                                              FIX200A   17
      200 CALL DBTM(IFM1,JFM1,KFM1,IF,JF,KF,IFP1,JFP1                               F292A      5
        . , U$V,F,NSU(1,1,KF),FO,DELKZ,D1,D3,D9)                                    F0530A     3
     *                                                                              UVBND     64
          DO 300 L=1,2                                                              UVBND     65
          DO 300 I=2,IFM1                                                           UVBND     66
          DO 300 J=2,JFM1                                                           UVBND     67
      300 U$V(I,J,KF,L)=U$V(I,J,KFM1,L) $ D9(I,J)                                   FIX201A   12
     *                                                                              UVBND     69
     *    NOW DO THE TOP.  WE SET TAU-SIGMA=TAU-Z, WE USE THE SURFACE               UVBND     70
     *      CONDITIONS (EQN. 3.31) FOR TAU-SIGMA, AND WE SOLVE EQNS. 3.19           UVBND     71
     *      FOR THE DELTA-K U$V.                                                    UVBND     72
     *                                                                              UVBND     73
     *    WE DON'T HAVE DZBRKI AT THE CORRECT K LEVEL, SO WE MUST                   UVBND     74
     *      RECALCULATE IT.                                                         UVBND     75
     *      NOTE:  Z3 - Z1= Z3 - (2 * Z2 - Z3)  BY EQN. 3.25A.                      UVBND     76
     *                                                                              UVBND     77
     *                                        SINCE THE WIND STRESS IS AT           F1027C     3
     *                                        THE INCORRECT TIME, APPLY A           F1027C     4
     *                                        SIMPLY CONDITION                      F1027C     5
     *                                                                              F1027C     6
          DO 450 L 1,2                                                              UVBND    103
          DO 450 I 2,IFM1                                                           UVBND    104
          DO 450 J 2,JFM1                                                           UVBND    105
      450 U$V(I,J,1,L) U$V(I,J,2,L)                                                 F1027C     8
     *                                                                              UVBND    107
     *    NOW DO THE LATERAL BOUNDARIES.                                            UVBND    108
     *                                                                              UVBND    109
     *    APPLY BOUNDARY CONDITIONS [illegible]                                     UVBND    110
     *      (NO FLUX LATERAL BOUNDARIES)                                            UVBND    111
```

```
      $                                                        UVBND      112
            DO 5 K=1,KF                                        UVBND      113
      $                                                        UVBND      114
      $$$$U                                                    UVBND      115
            L=1                                                UVBND      116
      $                                                        F011281A     6
            IF (CASE.EQ.4) GO TO 12                            F011281A     7
            DO 10 J=2,JFM1                                     UVBND      117
            USV(1,J,K,L)= - USV(2,J,K,L)                       UVBND      118
            USV(IF,J,K,L)= - USV(IFM1,J,K,L)                   UVBND      119
         10 CONTINUE                                           UVBND      120
            GO TO 18                                           F011281A     9
         12 CONTINUE                                           F011281A    10
            DO 15 J=2,JFM1                                     F011281A    11
            USV(1,J,K,L)=USV(2,J,K,L)                          F011281A    12
            USV(IF,J,K,L)=USV(IFM1,J,K,L)                      F011281A    13
         15 CONTINUE                                           F011281A    14
      $                                                        F011281A    15
         18 CONTINUE                                           F011281A    16
      $                                                        UVBND      121
            DO 20 I=1,IF                                       UVBND      122
            USV(I,1,K,L)=USV(I,2,K,L)                          UVBND      123
            USV(I,JF,K,L)=USV(I,JFM1,K,L)                      UVBND      124
         20 CONTINUE                                           UVBND      125
      $                                                        UVBND      126
      $$$$V                                                    UVBND      127
            L=2                                                UVBND      128
            DO 30 J=2,JFM1                                     UVBND      129
            USV(1,J,K,L)=USV(2,J,K,L)                          UVBND      130
            USV(IF,J,K,L)=USV(IFM1,J,K,L)                      UVBND      131
         30 CONTINUE                                           UVBND      132
      $                                                        UVBND      133
            DO 40 I=1,IF                                       UVBND      134
            USV(I,1,K,L)= - USV(I,2,K,L)                       UVBND      135
            USV(I,JF,K,L)= - USV(I,JFM1,K,L)                   UVBND      136
         40 CONTINUE                                           UVBND      137
      $                                                        UVBND      138
          5 CONTINUE                                           UVBND      139
      $                                                        L081683A     5
      $     IMPLEMENT IMPOSED SIDE FLUXES                      L081683A     6
      $                                                        L081683A     7
            K=0                                                L081683A     8
            CALL ZSET3(K+2)                                    L081683A     9
            CALL KDEP2(K+1,1)                                  L081683A    10
      $                                                        L081683A    11
            DO 1000 K=1,KFM1                                   L081683A    12
      $                                                        L081683A    13
            CALL ZSET3(K+2)                                    L081683A    14
            CALL KDEP2(K+1,1)                                  L081683A    15
      $                                                        L082983B     3
      $     WE ARE WORKING AT K=K+1, SO RANGE IS REALLY FROM 2 -> KF    L082983B     4
      $                                                        L082983B     5
      $     USE ONLY INTERNAL POINTS:                          L082983B     6
      $                                                        L082983B     7
            IF (K+1 .EQ. KF) GO TO 1000                        L082983B     8
      $                                                        L081683A    16
      $     WEST EDGE                                          L081683A    17
      $                                                        L081683A    18
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          IF (FLUXIN(1) .EQ. 0.) GO TO 190                       L081683A   19
 *                                                                L020384A    3
 *        I AT EDGE SHOULD REALLY BE 1.5, BUT ALL QUANTITIES ARE L020384A    4
 *          SYMMETRIX, SO WE CAN USE 1=2                          L020384A    5
 *                                                                L020384A    6
          I=2                                                     L020384A    7
 *                                                                L021384B    3
          CON=1. / DINFL(1)                                       L021384B    4
          DO 105 J=1,JF                                           L021384B    5
          D1(I,J)=ZBARK(I,J,1) * CON                              L021384B    6
     105  D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,1)                      L021384B    7
 *                                                                L021384B    8
          CON=1. / DBOTBL(1)                                      L021384B    9
          DO 110 J=1,JF                                           L021384B   10
          D1(I,J)=D1(I,J) + 1.                                    L021384B   11
     110  D2(I,J)=D2(I,J) * CON                                   L021384B   12
 *                                                                L021384B   13
          IF (DINFLS(1) .GT. 1.E10) GO TO 119                     L021384B   14
 *                                                                L021384B   15
          DO 112 J=1,JF                                           L021384B   16
          D5(I,J)=DINFLS(1) - ZBARK(I,J,2)                        L021384B   17
     112  D6(I,J)=DINFLS(1) + ZBARK(I,J,2)                        L021384B   18
 *                                                                L021384B   19
          DO 114 J=1,JF                                           L021384B   20
     114  D6(I,J)=D6(I,J) * D1(I,J)                               L021384B   21
 *                                                                L021384B   22
          DO 116 J=1,JF                                           L021384B   23
     116  D1(I,J)=D5(I,J) / D6(I,J)                               L021384B   24
          GO TO 122                                               L021384B   25
 *                                                                L021384B   26
     119  CONTINUE                                                L021384B   27
          DO 120 J=1,JF                                           L021384B   28
     120  D1(I,J)=1. / D1(I,J)                                    L021384B   29
     122  CONTINUE                                                L021384B   30
 *                                                                L020384A   21
          DO 130 J=1,JF                                           L020384A   22
          D3(I,J)=D1(I,J) * D2(I,J)                               L020384A   23
      130 D4(I,J)=D1(I,J) + D2(I,J)                               L020384A   24
 *                                                                L020384A   25
          DO 140 J=1,JF                                           L020384A   26
      140 D3(I,J)=D3(I,J) / D4(I,J)                               L020384A   27
 *                                                                L020384A   28
          CON=2. * FLUXIN(1) * (1.-EXP(-FLOAT(ISTP)/30.))         L020384A   29
          DO 150 J=1,JF                                           L020384A   30
      150 D3(I,J)=D3(I,J) * CON                                   L020384A   31
 *                                                                L020384A   32
          DO 160 J=1,JF                                           L020384A   33
      160 U$V(1,J,K,1)=D3(I,J) - U$V(2,J,K,1)                     L020384A   34
 *                                                                L020384A   35
      190 CONTINUE                                                L081683A   20
 *                                                                L081683A   21
 *        EAST EDGE                                               L081683A   22
 *                                                                L081683A   23
          IF (FLUXIN(2) .EQ. 0.) GO TO 290                        L081683A   24
 *                                                                L081683A   25
 *        I AT EDGE SHOULD REALLY BE IF-.5, BUT ALL QUANTITIES ARE L081683A  26
 *          SYMMETRIX, SO WE CAN USE I=IF-1                       L081683A   27
 *                                                                L081683A   28
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      I=IFM1                                                L081683A  29
*                                                           L021384B  32
      CON=1. / DINFL(2)                                     L021384B  33
      DO 205 J=1,JF                                         L021384B  34
      D1(I,J)=ZBARK(I,J,2) * CON                            L021384B  35
205   D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)                    L021384B  36
*                                                           L021384B  37
      CON=1. / DBOTBL(2)                                    L021384B  38
      DO 210 J=1,JF                                         L021384B  39
      D1(I,J)=D1(I,J) + 1.                                  L021384B  40
210   D2(I,J)=D2(I,J) * CON                                 L021384B  41
*                                                           L021384B  42
      IF (DINFLS(2) .GT. 1.E10) GO TO 219                   L021384B  43
*                                                           L021384B  44
      DO 212 J=1,JF                                         L021384B  45
      D5(I,J)=DINFLS(2) - ZBARK(I,J,2)                      L021384B  46
212   D6(I,J)=DINFLS(2) + ZBARK(I,J,2)                      L021384B  47
*                                                           L021384B  48
      DO 214 J=1,JF                                         L021384B  49
214   D6(I,J)=D6(I,J) * D1(I,J)                             L021384B  50
*                                                           L021384B  51
      DO 216 J=1,JF                                         L021384B  52
216   D1(I,J)=D5(I,J) / D6(I,J)                             L021384B  53
      GO TO 222                                             L021384B  54
*                                                           L021384B  55
219   CONTINUE                                              L021384B  56
      DO 220 J=1,JF                                         L021384B  57
220   D1(I,J)=1. / D1(I,J)                                  L021384B  58
222   CONTINUE                                              L021384B  59
*                                                           L081683A  43
      DO 230 J=1,JF                                         L081683A  44
      D3(I,J)=D1(I,J) * D2(I,J)                             L081683A  45
  230 D4(I,J)=D1(I,J) + D2(I,J)                             L081683A  46
*                                                           L081683A  47
      DO 240 J=1,JF                                         L081683A  48
  240 D3(I,J)=D3(I,J) / D4(I,J)                             L081683A  49
*                                                           L081683A  50
      CON=2. * FLUXIN(2) * (1.-EXP(-FLOAT(ISTP)/30.))       L081683A  51
      DO 250 J=1,JF                                         L081683A  52
  250 D3(I,J)=D3(I,J) * CON                                 L081683A  53
*                                                           L081683A  54
      DO 260 J=1,JF                                         L081683A  55
  260 USV(IF,J,K,1)=D3(I,J) - USV(IFM1,J,K,1)               L081683A  56
*                                                           L081683A  57
  290 CONTINUE                                              L081683A  58
*                                                           L081683A  59
*     SOUTH EDGE                                            L081683A  60
*                                                           L081683A  61
      IF (FLUXIN(3) .EQ. 0.) GO TO 390                      L081683A  62
*                                                           L081683A  63
*     J AT EDGE SHOULD REALLY BE 1.5, BUT ALL QUANTITIES ARE L081683A  64
*       SYMMETRIX, SO WE CAN USE J = 2                      L081683A  65
*                                                           L081683A  66
      J=2                                                   L081683A  67
*                                                           L021384B  61
      CON=1. / DINFL(3)                                     L021384B  62
      DO 305 I=1,IF                                         L021384B  63
      D1(I,J)=ZBARK(I,J,2) * CON                            L021384B  64
```

```
 305  D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)                           L021384B    65
 *                                                                  L021384B    66
      CON=1. / DBOTBL(3)                                            L021384B    67
      DO 310 I=1,IF                                                 L021384B    68
      D1(I,J)=D1(I,J) + 1.                                          L021384B    69
 310  D2(I,J)=D2(I,J) * CON                                         L021384B    70
 *                                                                  L021384B    71
      IF (DINFLS(3) .GT. 1.E10) GO TO 319                           L021384B    72
 *                                                                  L021384B    73
      DO 312 I=1,IF                                                 L021384B    74
      D5(I,J)=DINFLS(3) - ZBARK(I,J,2)                              L021384B    75
 312  D6(I,J)=DINFLS(3) + ZBARK(I,J,2)                              L021384B    76
 *                                                                  L021384B    77
      DO 314 I=1,IF                                                 L021384B    78
 314  D6(I,J)=D6(I,J) * D1(I,J)                                     L021384B    79
 *                                                                  L021384B    80
      DO 316 I=1,IF                                                 L021384B    81
 316  D1(I,J)=D5(I,J) / D6(I,J)                                     L021384B    82
      GO TO 322                                                     L021384B    83
 *                                                                  L021384B    84
 319  CONTINUE                                                      L021384B    85
      DO 320 I=1,IF                                                 L021384B    86
 320  D1(I,J)=1. / D1(I,J)                                          L021384B    87
 322  CONTINUE                                                      L021384B    88
 *                                                                  L081683A    81
      DO 330 I=1,IF                                                 L081683A    82
      D3(I,J)=D1(I,J) * D2(I,J)                                     L081683A    83
   330 D4(I,J)=D1(I,J) + D2(I,J)                                    L081683A    84
 *                                                                  L081683A    85
      DO 340 I=1,IF                                                 L081683A    86
   340 D3(I,J)=D3(I,J) / D4(I,J)                                    L081683A    87
 *                                                                  L081683A    88
      CON=2. * FLUXIN(3) * (1.-EXP(-FLOAT(ISTF)/30.))               L081683A    89
      DO 350 I=1,IF                                                 L081683A    90
   350 D3(I,J)=D3(I,J) * CON                                        L081683A    91
 *                                                                  L081683A    92
      DO 360 I=1,IF                                                 L081683A    93
   360 USV(I,1,K,2)=D3(I,J) - USV(I,2,K,2)                          L081683A    94
 *                                                                  L081683A    95
   390 CONTINUE                                                     L081683A    96
 *                                                                  L081683A    97
 *    NORTH EDGE                                                    L081683A    98
 *                                                                  L081683A    99
      IF (FLUXIN(4) .EQ. 0.) GO TO 490                              L081683A   100
 *                                                                  L020384A    37
 *    J AT EDGE SHOULD REALLY BE JF-.5, BUT ALL QUANTITIES ARE      L020384A    38
 *      SYMMETRIX, SO WE CAN USE J = JF-1                           L020384A    39
 *                                                                  L020384A    40
      J=JFM1                                                        L020384A    41
 *                                                                  L021384B    90
      CON=1. / DINFL(4)                                             L021384B    91
      DO 405 I=1,IF                                                 L021384B    92
      D1(I,J)=ZBARK(I,J,2) * CON                                    L021384B    93
 405  D2(I,J)=ZBOTHH(I,J) - ZBARK(I,J,2)                            L021384B    94
 *                                                                  L021384B    95
      CON=1. / DBOTBL(4)                                            L021384B    96
      DO 410 I=1,IF                                                 L021384B    97
      D1(I,J)=D1(I,J) + 1.                                          L021384B    98
```

```
410   D2(I,J)=D2(I,J) * CON                                  L021384B    99
*                                                            L021384B   100
      IF (DINFLS(4) .GT. 1.E10) GO TO 419                    L021384B   101
*                                                            L021384B   102
      DO 412 I=1,IF                                          L021384B   103
      D5(I,J)=DINFLS(4) - ZBARK(I,J,2)                       L021384B   104
412   D6(I,J)=DINFLS(4) + ZBARK(I,J,2)                       L021384B   105
*                                                            L021384B   106
      DO 414 I=1,IF                                          L021384B   107
414   D6(I,J)=D6(I,J) * D1(I,J)                              L021384B   108
*                                                            L021384B   109
      DO 416 I=1,IF                                          L021384B   110
416   D1(I,J)=D5(I,J) / D6(I,J)                              L021384B   111
      GO TO 422                                              L021384B   112
*                                                            L021384B   113
419   CONTINUE                                               L021384B   114
      DO 420 I=1,IF                                          L021384B   115
420   D1(I,J)=1. / D1(I,J)                                   L021384B   116
422   CONTINUE                                               L021384B   117
*                                                            L020384A    55
      DO 430 I=1,IF                                          L020384A    56
      D3(I,J)=D1(I,J) * D2(I,J)                              L020384A    57
  430 D4(I,J)=D1(I,J) + D2(I,J)                              L020384A    58
*                                                            L020384A    59
      DO 440 I=1,IF                                          L020384A    60
  440 D3(I,J)=D3(I,J) / D4(I,J)                              L020384A    61
*                                                            L020384A    62
      CON=2. * FLUXIN(4) * (1.-EXP(-FLOAT(ISTP)/30.))        L020384A    63
      DO 455 I=1,IF                                          L020384A    64
  455 D3(I,J)=D3(I,J) * CON                                  L020384A    65
*                                                            L020384A    66
      DO 460 I=1,IF                                          L020384A    67
  460 U*V(I,JF,K,2)=D3(I,J) - U*V(I,JFM1,K,2)                L020384A    68
*                                                            L020384A    69
  490 CONTINUE                                               L081683A   101
*                                                            L081683A   102
 1000 CONTINUE                                               L081683A   103
*                                                            L081683A   104
*                                                            UVBND      140
*                                                            UVBND      141
      RETURN                                                 UVBND      142
      END                                                    UVBND      143
```

323 ACTIVE LINE(S)   161 INACTIVE LINE(S)

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*** SMS109 : DECK UVDOTB   IS EDITED FROM SPL      FILE
CREATED ON 07/13/79 AT 10:43:39          LAST UPDATED ON 07/27/83 AT 10:25:28 BY SMS VERSION 5.27
LANGUAGE:                 USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: XFONT190  F292A    DMPGPI    F306A    DMPGPI2   REFIX317  PISWEEP6  L0726830  L0727030

      SUBROUTINE UVDOTB(K)                                             UVDOTB      1
*                                                                      UVDOTB      2
*     THIS ROUTINE IS PART "B" OF A TWO PART ROUTINE.  PART "A"        UVDOTB      3
*     MUST BE CALLED FIRST.                                            UVDOTB      4
*                                                                      UVDOTB      5
*CALL ALLMAC                                                           UVDOTB      6
*                                                                      UVDOTB      7
      DIMENSION D12(IFP1,JFP1,2),D22(IFP1,JFP1,2),D32(IFP1,JFP1,2)     F292A       3
     . , VOLI(IFP1,JFP1),ANSR(IFR2,JFR2,2,KF),GRADPI(IF,JF,2)          PISWEEP6    3
     . , UUVG(IF,JF,2)                                                 L0727030    3
*                                                                      UVDOTB     10
      EQUIVALENCE (D12,D1),(D22,D3),(D32,D5)                           UVDOTB     11
     . , (VOLI,D9),(ANS,ANSR),(GRADPI,PISAV1)                          PISWEEP6    5
     . , (D7,UUVG)                                                     L0727030    5
*                                                                      L0727030    6
*     NOTE: EQUIVALENCE FOR UUVG OVERLAPS USE OF D7 AND D8             L0727030    7
*       => CAN'T USE DMPGPI=T                                          L0727030    8
*                                                                      L0727030    9
*                                                                      UVDOTB     13
*                                                                      UVDOTB     16
*>>>>>>>>>>                                                            UVDOTB     17
          M=1                                                          UVDOTB     18
*>>>>>>>>>>                                                            UVDOTB     19
*                                                                      UVDOTB     20
      IF (K.EQ.1) GO TO 8005                                           UVDOTB     21
*                                                                      UVDOTB     22
*     D TH    TERM                                                     UVDOTB     23
*                                                                      UVDOTB     24
*HHHH                                                                  UVDOTB     25
      DO 810 I=1,IF                                                    UVDOTB     26
      DO 810 J=2,JF                                                    UVDOTB     27
  810 D7(I,J)=ALFP(I,J) + ALFP(I,J-1)                                  UVDOTB     28
*HHHH                                                                  UVDOTB     29
      DO 820 I=2,IFM1                                                  UVDOTB     30
      DO 820 J=2,JF                                                    UVDOTB     31
  820 D8(I,J)=TPL(I+1,J,M) + TPL(I,J,M)                                UVDOTB     32
*                                                                      UVDOTB     33
      DO 830 I=2,IFM1                                                  UVDOTB     34
      DO 830 J=2,JF                                                    UVDOTB     35
  830 D8(I,J)=D8(I,J) * .5E0                                           UVDOTB     36
*                                                                      UVDOTB     37
      DO 840 I=2,IFM1                                                  UVDOTB     38
      DO 840 J=2,JF                                                    UVDOTB     39
  840 D12(I,J,1)=D7(I,J) * D8(I,J)                                     UVDOTB     40
*                                                                      UVDOTB     41
      DO 850 I=2,IFM1                                                  UVDOTB     42
      DO 850 J=2,JF                                                    UVDOTB     43
  850 D12(I,J,2)=D7(I,J) * TPP(I,J,M)                                  UVDOTB     44
*                                                                      UVDOTB     45
      DO 860 L=1,2                                                     UVDOTB     46
```

```
      DO 860 I=2,IFM1                                        UVDOTB    47
      DO 860 J=2,JFM1                                        UVDOTB    48
  860 D22(I,J,L)=D12(I,J+1,L) - D12(I,J,L)                   UVDOTB    49
*                                                            UVDOTB    50
      DO 870 L=1,2                                           UVDOTB    51
      DO 870 I=2,IFM1                                        UVDOTB    52
      DO 870 J=2,JFM1                                        UVDOTB    53
  870 D22(I,J,L)=D22(I,J,L) * .5E0                           UVDOTB    54
*                                                            UVDOTB    55
      DO 880 L=1,2                                           UVDOTB    56
      DO 880 I=2,IFM1                                        UVDOTB    57
      DO 880 J=2,JFM1                                        UVDOTB    58
  880 ANSR(I-1,J-1,L,K)=ANSR(I-1,J-1,L,K) + D22(I,J,L)       UVDOTB    59
*                                                            UVDOTB    60
*     9 TH     TERM                                          UVDOTB    61
*                                                            UVDOTB    62
*     CALCULATE AHEAD                                        UVDOTB    63
*                                                            UVDOTB    64
 8005 CONTINUE                                               UVDOTB    65
*                                                            UVDOTB    66
      DO 930 I=2,IFM1                                        UVDOTB    67
      DO 930 J=2,JFM1                                        UVDOTB    68
  930 D12(I,J,1)=ALFZIJ(I,J) * TSL02(I,J)                    UVDOTB    69
*                                                            UVDOTB    70
      DO 940 I=2,IFM1                                        UVDOTB    71
      DO 940 J=2,JFM1                                        UVDOTB    72
  940 D12(I,J,2)=ALFZIJ(I,J) * TSP02(I,J)                    UVDOTB    73
      IF (K.EQ.1) GO TO 8006                                 UVDOTB    74
*                                                            UVDOTB    75
      DO 950 L=1,2                                           UVDOTB    76
      DO 950 I=2,IFM1                                        UVDOTB    77
      DO 950 J=2,JFM1                                        UVDOTB    78
  950 D22(I,J,L)=D12(I,J,L) - UVSAV3(I,J,L)                  UVDOTB    79
*                                                            UVDOTB    80
 8006 CONTINUE                                               UVDOTB    81
*                                                            UVDOTB    82
      DO 960 L=1,2                                           UVDOTB    83
      DO 960 I=2,IFM1                                        UVDOTB    84
      DO 960 J=2,JFM1                                        UVDOTB    85
  960 UVSAV3(I,J,L)=D12(I,J,L)                               UVDOTB    86
      IF (K.EQ.1) RETURN                                     UVDOTB    87
*                                                            UVDOTB    88
      DO 970 L=1,2                                           UVDOTB    89
      DO 970 I=2,IFM1                                        UVDOTB    90
      DO 970 J=2,JFM1                                        UVDOTB    91
  970 ANSR(I-1,J-1,L,K)=ANSR(I-1,J-1,L,K) + D22(I,J,L)       UVDOTB    92
*                                                            UVDOTB    93
*     FIND THE VOLUME (LEAVING THE APPROPRIATE QUANTITY IN D10  REFIX317   3
*       FOR USE IN RESET).                                   REFIX317   4
*                                                            UVDOTB    95
      CALL VOL1(DELKZ,ALFZ,D3,D10,VOL1,1                     REFIX317   6
     * , IF,JF,N,IFP1,JFP1,IFM1,JFM1)                        UVDOTB    97
*                                                            UVDOTB    98
      DO 980 L=1,2                                           UVDOTB    99
      DO 980 I=2,IFM1                                        UVDOTB   100
      DO 980 J=2,JFM1                                        UVDOTB   101
  980 ANSR(I-1,J-1,L,K)=ANSR(I-1,J-1,L,K) + VOL1(I,J)        UVDOTB   102
*                                                            UVDOTB   103
```

```
*     NEXT TERM --- START ON BRACKET
*
      DO 1000 L=1,2
      DO 1000 I=1,IF
      DO 1000 J=1,JF
 1000 D12(I,J,L)=UUV(I,J,K,1) * UUV(I,J,K,3-L)
*****
      DO 1010 I=2,IFM1
      DO 1010 J=2,JF
 1010 D7(I,J)=TPL(I+1,J,M) + TPL(I,J,M)
*****
      DO 1020 I=2,IFM1
      DO 1020 J=2,JFM1
 1020 D8(I,J)=D7(I,J+1) + D7(I,J)
*
      DO 1030 I=2,IFM1
      DO 1030 J=2,JFM1
 1030 D32(I,J,1)=D8(I,J) * .25E0
*****
      DO 1040 I=2,IFM1
      DO 1040 J=2,JFM1
 1040 D7(I,J)=TLL(I+1,J,M) + TLL(I,J,M)
*
      DO 1050 I=2,IFM1
      DO 1050 J=2,JFM1
 1050 D32(I,J,2)=D7(I,J) * .5E0
*
*
      DO 1060 L=1,2
      DO 1060 I=2,IFM1
      DO 1060 J=2,JFM1
 1060 D12(I,J,L)=D12(I,J,L) - D32(I,J,L)
*
      DO 1070 J=2,JFM1
 1070 D7(1,J)=CBARI(J) * SBAR(J)
*
      DO 1080 J=2,JFM1
 1080 D7(1,J)=D7(1,J) * AINV
*
      DO 1130 L=1,2
      DO 1130 I=2,IFM1
      DO 1130 J=2,JFM1
 1130 D12(I,J,L)=D12(I,J,L) * D7(1,J)
*
      DO 1140 I=2,IFM1
      DO 1140 J=2,JFM1
 1140 ANSR(I-1,J-1,1,K)=ANSR(I-1,J-1,1,K) + D12(I,J,1)
*
      DO 1150 I=2,IFM1
      DO 1150 J=2,JFM1
 1150 ANSR(I-1,J-1,2,K)=ANSR(I-1,J-1,2,K) - D12(I,J,2)
*
*     NEXT TERM
*
      DO 1170 L=1,2
      DO 1170 I=2,IFM1
      DO 1170 J=2,JFM1
 1170 D12(I,J,L)=F(I,J) * UUV(I,J,K,3-L)
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*                                                              UVDOTB     162
       DO 1100 I=2,IFM1                                        UVDOTB     163
       DO 1100 J=2,JFM1                                        UVDOTB     164
  1100 ANSR(I-1,J-1,1,K)=ANSR(I-1,J-1,1,K) + D12(I,J,1)        UVDOTB     165
*                                                              UVDOTB     166
       DO 1190 I=2,IFM1                                        UVDOTB     167
       DO 1190 J=2,JFM1                                        UVDOTB     168
  1190 ANSR(I-1,J-1,2,K)=ANSR(I-1,J-1,2,K) - D12(I,J,2)        UVDOTB     169
*                                                              UVDOTB     170
*      LAST TERM IN U DOT EQUATION                             UVDOTB     171
*                                                              UVDOTB     172
       IF (.NOT.OLDPI) GO TO 1341                              PISWEEP6     7
*****                                                          UVDOTB     173
       DO 1310 I=2,IFM1                                        UVDOTB     174
       DO 1310 J=2,JF                                          UVDOTB     175
  1310 D1(I,J)=ZBRIJK(I+1,J,N) - ZBRIJK(I,J,N)                 UVDOTB     176
*****                                                          UVDOTB     177
       DO 1320 I=2,IFM1                                        UVDOTB     178
       DO 1320 J=2,JFM1                                        UVDOTB     179
  1320 D2(I,J)=D1(I,J+1) + D1(I,J)                             UVDOTB     180
*****                                                          UVDOTB     181
       DO 1330 I=2,IFM1                                        UVDOTB     182
       DO 1330 J=2,JFM1                                        UVDOTB     183
  1330 D2(I,J)=D2(I,J) * .5E0                                  UVDOTB     184
*****                                                          UVDOTB     185
       DO 1340 I=2,IFM1                                        UVDOTB     186
       DO 1340 J=2,JFM1                                        UVDOTB     187
  1340 D2(I,J)=D2(I,J) * PIAV(I,J,3)                           UVDOTB     188
  1341 CONTINUE                                                PISWEEP6     9
*****                                                          UVDOTB     189
       DO 1350 I=2,IF                                          UVDOTB     190
       DO 1350 J=1,JF                                          UVDOTB     191
  1350 D5(I,J)=DELRZ(I,J,N) + DELRZ(I-1,J,N)                   UVDOTB     192
*****                                                          UVDOTB     193
       DO 1360 I=2,IFM1                                        UVDOTB     194
       DO 1360 J=1,JF                                          UVDOTB     195
  1360 D6(I,J)=D5(I+1,J) + D5(I,J)                             UVDOTB     196
*****                                                          UVDOTB     197
       DO 1370 I=2,IFM1                                        UVDOTB     198
       DO 1370 J=2,JF                                          UVDOTB     199
  1370 D5(I,J)=D6(I,J) + D6(I,J-1)                             UVDOTB     200
*****                                                          UVDOTB     201
       DO 1380 I=2,IFM1                                        UVDOTB     202
       DO 1380 J=2,JFM1                                        UVDOTB     203
  1380 D6(I,J)=D5(I,J+1) + D5(I,J)                             UVDOTB     204
*****                                                          UVDOTB     205
       DO 1390 I=2,IFM1                                        UVDOTB     206
       DO 1390 J=2,JFM1                                        UVDOTB     207
  1390 D5(I,J)=D6(I,J) * .0625E0                               UVDOTB     208
       IF (.NOT.OLDPI) GO TO 1413                              PISWEEP6    11
*****                                                          UVDOTB     209
       DO 1400 I=2,IFM1                                        UVDOTB     210
       DO 1400 J=2,JFM1                                        UVDOTB     211
  1400 D1(I,J)=D5(I,J) * PIAV(I,J,1)                           UVDOTB     212
*                                                              UVDOTB     213
       DO 1410 I=2,IFM1                                        UVDOTB     214
       DO 1410 J=2,JFM1                                        UVDOTB     215
  1410 D2(I,J)=D1(I,J) - D2(I,J)                               UVDOTB     216
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```
      *                                                              PISWEEP6  13
            GO TO 1417                                               PISWEEP6  14
       1413 CONTINUE                                                 PISWEEP6  15
            DO 1415 J=2,JFM1                                         PISWEEP6  16
            DO 1415 I=2,IFM1                                         PISWEEP6  17
       1415 D2(I,J)=GRADPI(I,J,1) * D5(I,J)                          PISWEEP6  18
       1417 CONTINUE                                                 PISWEEP6  19
      *                                                              UVDOTB   217
            A=1.E0 / AINV                                            UVDOTB   218
            DO 1420 J=2,JFM1                                         UVDOTB   219
       1420 D1(1,J)=A * DPBAR(J)                                     UVDOTB   220
      *                                                              UVDOTB   221
            DO 1430 I=2,IFM1                                         UVDOTB   222
            DO 1430 J=2,JFM1                                         UVDOTB   223
       1430 D2(I,J)=D2(I,J) * D1(1,J)                                UVDOTB   224
      *                                                              UVDOTB   225
            DO 1435 I=2,IFM1                                         UVDOTB   226
            DO 1435 J=2,JFM1                                         UVDOTB   227
       1435 D2(I,J)=D2(I,J) * VOLI(I,J)                              UVDOTB   228
      *                                                              L0726030   3
            IF (.NOT. OLDPI) GO TO 1438                              L0726030   4
            DO 1437 I=2,IFM1                                         L0726030   5
            DO 1437 J=2,JFM1                                         L0726030   6
       1437 UGVG(I,J,2)=D2(I,J) / F(I,J)                             L0726030   7
       1438 CONTINUE                                                 L0726030   8
      *                                                              DAPGPI     3
            IF (.NOT.DAPGPI) GO TO 1490                              DAPGPI     4
            DO 1440 J=2,JF                                           DAPGPI     5
            DO 1440 I=2,IFM1                                         DAPGPI     6
       1440 D7(I,J)=ZBRIJK(I,J,M) + ZBRIJK(I+1,J,M)                  DAPGPI     7
      *                                                              DAPGPI     8
            DO 1445 J=2,JFM1                                         DAPGPI     9
            DO 1445 I=2,IFM1                                         DAPGPI    10
       1445 D8(I,J)=D7(I,J) + D7(I,J+1)                              DAPGPI    11
      *                                                              DAPGPI    12
            DO 1450 J=2,JFM1                                         DAPGPI    13
            DO 1450 I=2,IFM1                                         DAPGPI    14
       1450 D8(I,J)=D8(I,J) * .25                                    DAPGPI    15
      *                                                              DAPGPI    16
            DO 1455 J=2,JFM1                                         DAPGPI    17
            DO 1455 I=2,IFM1                                         DAPGPI    18
       1455 D8(I,J)=D8(I,J) + ZBARK(I,J,M)                           DAPGPI    19
      *                                                              DAPGPI    20
            DO 1460 J=2,JFM1                                         DAPGPI    21
            DO 1460 I=2,IFM1                                         DAPGPI    22
       1460 D7(I,J)=D8(I,J) * D8(I,J)                                DAPGPI    23
      *                                                              DAPGPI    24
            DO 1465 J=2,JFM1                                         DAPGPI    25
            DO 1465 I=2,IFM1                                         DAPGPI    26
       1465 D8(I,J)=D7(I,J) * D8(I,J)                                DAPGPI    27
      *                                                              DAPGPI    28
            DO 1470 J=2,JFM1                                         DAPGPI    29
            DO 1470 I=2,IFM1                                         DAPGPI    30
       1470 D8(I,J)=D8(I,J) * GRADZB(I,J)                            DAPGPI2    3
            DO 1473 J=2,JFM1                                         F306A      3
            DO 1473 I=2,IFM1                                         F306A      4
       1473 D8(I,J)=EXP(D8(I,J))                                     F306A      5
      *                                                              DAPGPI    32
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          DO 1475 J=2,JFM1                                          DAPGPI      33
          DO 1475 I=2,IFM1                                          DAPGPI      34
     1475 D2(I,J)=D2(I,J) + DB(I,J)                                 DAPGPI      35
     1490 CONTINUE                                                  DAPGPI      36
C                                                                   UVDOTB     229
          DO 1495 I=2,IFM1                                          DAPGPI      38
          DO 1495 J=2,JFM1                                          DAPGPI      39
     1495 ANSR(I-1,J-1,1,K)=ANSR(I-1,J-1,1,K) - D2(I,J)             DAPGPI      40
C                                                                   UVDOTB     233
          IF (.NOT.OLDPI) GO TO 1563                                PISWEEP6    21
CHHH                                                                UVDOTB     234
          DO 1510 I=2,IF                                            UVDOTB     235
          DO 1510 J=2,JFM1                                          UVDOTB     236
     1510 D1(I,J)=ZBRIJK(I,J+1,K) - ZBRIJK(I,J,K)                   UVDOTB     237
CHHH                                                                UVDOTB     238
          DO 1520 I=2,IFM1                                          UVDOTB     239
          DO 1520 J=2,JFM1                                          UVDOTB     240
     1520 D2(I,J)=D1(I+1,J) + D1(I,J)                               UVDOTB     241
CHHH                                                                UVDOTB     242
          DO 1530 I=2,IFM1                                          UVDOTB     243
          DO 1530 J=2,JFM1                                          UVDOTB     244
     1530 D1(I,J)=D2(I,J) * .5E0                                    UVDOTB     245
C                                                                   UVDOTB     246
          DO 1540 I=2,IFM1                                          UVDOTB     247
          DO 1540 J=2,JFM1                                          UVDOTB     248
     1540 D1(I,J)=D1(I,J) * PIAV(I,J,3)                             UVDOTB     249
C                                                                   UVDOTB     250
          DO 1550 I=2,IFM1                                          UVDOTB     251
          DO 1550 J=2,JFM1                                          UVDOTB     252
     1550 D2(I,J)=DS(I,J) * PIAV(I,J,2)                             UVDOTB     253
C                                                                   UVDOTB     254
          DO 1560 I=2,IFM1                                          UVDOTB     255
          DO 1560 J=2,JFM1                                          UVDOTB     256
     1560 D2(I,J)=D2(I,J) - D1(I,J)                                 UVDOTB     257
C                                                                   PISWEEP6    23
          GO TO 1567                                                PISWEEP6    24
     1563 CONTINUE                                                  PISWEEP6    25
          DO 1565 J=2,JFM1                                          PISWEEP6    26
          DO 1565 I=2,IFM1                                          PISWEEP6    27
     1565 D2(I,J)=GRADPI(I,J,2) * DS(I,J)                           PISWEEP6    28
     1567 CONTINUE                                                  PISWEEP6    29
C                                                                   UVDOTB     258
          DO 1570 I=2,IFM1                                          UVDOTB     259
          DO 1570 J=2,JFM1                                          UVDOTB     260
     1570 D1(I,J)=CBAR(J) * A                                       UVDOTB     261
C                                                                   UVDOTB     262
          DO 1580 I=2,IFM1                                          UVDOTB     263
          DO 1580 J=2,JFM1                                          UVDOTB     264
     1580 D3(I,J)=D1(I,J) * DLBAR(I)                                UVDOTB     265
C                                                                   UVDOTB     266
          DO 1590 I=2,IFM1                                          UVDOTB     267
          DO 1590 J=2,JFM1                                          UVDOTB     268
     1590 D2(I,J)=D2(I,J) * D3(I,J)                                 UVDOTB     269
C                                                                   UVDOTB     270
          DO 1592 I=2,IFM1                                          L0726030    10
          DO 1592 J=2,JFM1                                          L0726030    11
     1592 D2(I,J)=D2(I,J) * VOLI(I,J)                               L0726030    12
C                                                                   L0726030    13
```

```
          IF (.NOT.OLDPI) GO TO 1595                          L0726030    14
          DO 1593 I=2,IFM1                                    L0726030    15
          DO 1593 J=2,JFM1                                    L0726030    16
     1593 UAVG(I,J,1)=D2(I,J) / F(I,J)                        L0726030    17
     *                                                        L0726030    18
          DO 1594 I=2,IFM1                                    L0726030    19
          DO 1594 J=2,JFM1                                    L0726030    20
     1594 UAVG(I,J,1)=-UAVG(I,J,1)                            L0726030    21
     *                                                        L0726030    22
          WRITE (12) UAVG                                     L0726030    23
     *                                                        L0726030    24
     1595 CONTINUE                                            L0726030    25
     *                                                        DRPGPI      42
          IF (.NOT.DRPGPI) GO TO 1598                         DRPGPI      43
          DO 1597 J=2,JFM1                                    DRPGPI      44
          DO 1597 I=2,IFM1                                    DRPGPI      45
     1597 D2(I,J)=D2(I,J) + DD(I,J)                           DRPGPI      46
     1598 CONTINUE                                            DRPGPI      47
     *                                                        UVDOTB     274
          DO 1600 I=2,IFM1                                    UVDOTB     275
          DO 1600 J=2,JFM1                                    UVDOTB     276
     1600 ANSA(I-1,J-1,2,K)=ANSA(I-1,J-1,2,K) - D2(I,J)       UVDOTB     277
     *                                                        UVDOTB     303
     *                                                        UVDOTB     304
          RETURN                                              UVDOTB     305
          END                                                 UVDOTB     306
```

366 ACTIVE LINE(S)   40 INACTIVE LINE(S)

UE UVGEO

```
*** SMS109 : DECK UVGEO    IS EDITED FROM SPL       FILE
CREATED ON 07/26/83 AT 13:03:37         LAST UPDATED ON 07/27/83 AT 10:25:31 BY SMS VERSION 5.27
LANGUAGE:            USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: L0727830

            SUBROUTINE UVGEO                                            UVGEO         1
      *                                                                 UVGEO         2
      *     THIS ROUTINE TAKES THE 2-D DATA WRITTEN OUT BY UVBND, AND   UVGEO         3
      *       CREATES A 3-D ARRAY                                       UVGEO         4
      *                                                                 UVGEO         5
      $CALL ALLMAC                                                      UVGEO         6
      *                                                                 UVGEO         7
            DIMENSION UGV3D(IF,JF,KF,2)                                 UVGEO         8
           . , UGVG(IF,JF,2)                                            L0727830      3
            EQUIVALENCE (UGV3D,ANS)                                     UVGEO         9
           . , (D7,UGVG)                                                L0727830      5
      *                                                                 UVGEO        10
            REWIND 12                                                   UVGEO        11
      *                                                                 UVGEO        12
            DO 100 K=2,KFM1                                             UVGEO        13
            READ (12) UGVG                                              UVGEO        14
      *                                                                 UVGEO        15
            DO 90 L=1,2                                                 UVGEO        16
            DO 90 J=2,JFM1                                              UVGEO        17
            DO 90 I=2,IFM1                                              UVGEO        18
            UGV3D(I,J,K,L)=UGVG(I,J,L)                                  UVGEO        19
         90 CONTINUE                                                    UVGEO        20
        100 CONTINUE                                                    UVGEO        21
      *                                                                 UVGEO        22
      *     BOUNDARY CONDITIONS                                         UVGEO        23
      *                                                                 UVGEO        24
            DO 200 L=1,2                                                UVGEO        25
            DO 200 J=2,JFM1                                             UVGEO        26
            DO 200 I=2,IFM1                                             UVGEO        27
            UGV3D(I,J,KF,L)=UGV3D(I,J,KFM1,L)                           UVGEO        28
            UGV3D(I,J, 1,L)=UGV3D(I,J,   2,L)                           UVGEO        29
        200 CONTINUE                                                    UVGEO        30
      *                                                                 UVGEO        31
      *     APPLY BOUNDARY CONDITIONS:  EQNS. 3.36 AND 3.37             UVGEO        32
      *       (NO FLUX LATERAL BOUNDARY.)                               UVGEO        33
      *                                                                 UVGEO        34
            DO 200 K=1,KF                                               UVGEO        35
      *                                                                 UVGEO        36
      ****U                                                             UVGEO        37
            L=1                                                         UVGEO        38
      *                                                                 UVGEO        39
            DO 220 J=2,JFM1                                             UVGEO        40
            UGV3D( 1,J,K,L)= - UGV3D(   2,J,K,L)                        UVGEO        41
            UGV3D(IF,J,K,L)= - UGV3D(IFM1,J,K,L)                        UVGEO        42
        220 CONTINUE                                                    UVGEO        43
      *                                                                 UVGEO        44
            DO 230 I=1,IF                                               UVGEO        45
            UGV3D(I, 1,K,L)=UGV3D(I,   2,K,L)                           UVGEO        46
            UGV3D(I,JF,K,L)=UGV3D(I,JFM1,K,L)                           UVGEO        47
        230 CONTINUE                                                    UVGEO        48
```

```
      *
      *****V
            L=2
            DO 240 J=2,JFM1
            UUV3D( 1,J,K,L)=UUV3D(    2,J,K,L)
            UUV3D(IF,J,K,L)=UUV3D(IFM1,J,K,L)
        240 CONTINUE
      *
            DO 250 I=1,IF
            UUV3D(I, 1,K,L)= - UUV3D(I,    2,K,L)
            UUV3D(I,JF,K,L)= - UUV3D(I,JFM1,K,L)
        250 CONTINUE
      *
        200 CONTINUE
      *
            REWIND 12
      *
            RETURN
            END
```

69 ACTIVE LINE(S)   0 INACTIVE LINE(S)

Appendix B

TAPER JSL to Produce Combined Data Set and Listing of TAPER2

CREATED ON 02/15/84 AT 15:37:12 LAST UPDATED ON 02/15/84 AT 15:37:12 BY SMS VERSION 5.27
LANGUAGE: USER INFORMATION:

```
/ COM
/ COM      MACROS:
/ COM
/ COM   GET IS LIKE ASG
/ COM  RGET IS LIKE REL AND THEN ASG
/ COM   PUT IS LIKE CATV
/ COM   SEE IS LIKE FOSYS
/ COM
/ COM    PT IS THE PATH FOR THE TAPER OBJECT LIBRARY
/ COM
/ LIMIT MIN=2
/ RGET OBJLIB,PT/OBJLIB
/ REL SYS.LMOD
/ LNK
LIBRARY OBJLIB
INCLUDE TAPER2
/ REL FT31F001,FT32F001,FT33F001,FT34F001,FT35F001,FT36F001
/ REL FT41F001,FT42F001,FT43F001,FT44F001,FT45F001,FT46F001
/ REL FT51F001,FT52F001,FT53F001,FT54F001,FT55F001,FT56F001
/ REL FT71F001,FT72F001
/ RGET FT61F001,DOD/NAVY/NORDA/WARNA1/FNOCTAPE/SAIOCN1
/ SET N=1
/       REL FT06F001
/     FD FT06F001,BAND=2/20/2
/ FD FT71F001,BAND=4/50/4
/ FXOT OPT=(I),LTP=(99,99,N),ADDMEM=24K,CPTIME=6000
 &ONE
      IS=05, IE=28, JS=13, JE=51,
      YEAR=76,MONTH=10,DAY=29,HOUR=0,
      DT=24.,NT=1,NCATST=7,
      SIGMAD=T,
      CATNO='B10+','P14+','P15+','P16+','P17+','P18+','P19+',
 &END
/ COM
/ COM   OUTPUT ON FT71F001
/ COM
/ IF TERM.NE.0,ERR
/ SEE N,FT06F001,NAME=FILE6ONE
/ RGET OBJLIB,PT/OBJLIB
/ REL SYS.LMOD
/ LNK
LIBRARY OBJLIB
INCLUDE TAPER3
/ REL FT31F001,FT32F001,FT33F001,FT34F001,FT35F001,FT36F001
/ REL FT41F001,FT42F001,FT43F001,FT44F001,FT45F001,FT46F001
/ REL FT51F001,FT52F001,FT53F001,FT54F001,FT55F001,FT56F001
/ COM
/ COM  TAPER3 WRITES ON FT72 -> CHANGE SO THAT WE WILL APPEND
/ COM
/ REL FT72F001
/ RENAME FT71F001,FT72F001
/ FD FT72F001,POS=MOD
/ RGET FT61F001,AFFIL/IND/SAI/SEFTJ1/USER/NEDN/CLIMAT
/ SET N=1
```

```
/       REL FT06F001                                          TWODATA   55
/     FD FT06F001,BAND=2/20/2                                 TWODATA   56
/ FXOT OPT=(I),LTP=(99,99,N),ADDMEM=24K,CPTIME=4000           TWODATA   57
 &ONE                                                         TWODATA   58
     IS=05, IE=28, JS=13, JE=51,                              TWODATA   59
     NPN=20, SIGNAD=T,                                        TWODATA   60
 &END                                                         TWODATA   61
T  SEAJ                                                       TWODATA   62
T0400 J                                                       TWODATA   63
T0600 J                                                       TWODATA   64
T0800 J                                                       TWODATA   65
T1000 J                                                       TWODATA   66
T1500 J                                                       TWODATA   67
T2000 J                                                       TWODATA   68
T3000 J                                                       TWODATA   69
T4000 J                                                       TWODATA   70
T5000 J                                                       TWODATA   71
S0000 J                                                       TWODATA   72
S0050 J                                                       TWODATA   73
S0100 J                                                       TWODATA   74
S0200 J                                                       TWODATA   75
S0600 J                                                       TWODATA   76
S1000 J                                                       TWODATA   77
S2000 J                                                       TWODATA   78
S3000 J                                                       TWODATA   79
S4000 J                                                       TWODATA   80
S5000 J                                                       TWODATA   81
/ IF TERM.NE.0,ERR                                            TWODATA   82
/ PUT FT72F001,US/INITLDTA                                    TWODATA   83
/ SEE N,FT06F001,NAME=FILE6TWO                                TWODATA   84
/        REL FT31F001,FT32F001,FT33F001,FT34F001,FT35F001,FT36F001   TWODATA   85
/ REL FT41F001,FT42F001,FT43F001,FT44F001,FT45F001,FT46F001   TWODATA   86
/ REL FT51F001,FT52F001,FT53F001,FT54F001,FT55F001,FT56F001   TWODATA   87
/ERR NOP                                                      TWODATA   88
```

88 ACTIVE LINE(S)   0 INACTIVE LINE(S)

$$$ SMS167 : PDS DIRECTORY FOR NEWSPL   FILE SUCCESSFULLY UPDATED FOR DECK TWODATA
$

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SMS VERSION 5.27    LISTING OF DECK    T A P E R 2                                          01/12/84          PAGE 1

*** SMS109 : DECK TAPER2   IS EDITED FROM SPL        FILE
CREATED ON 07/31/80 AT 10:13:40            LAST UPDATED ON 04/04/83 AT 11:46:25 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F07318    F0909A    F0911A    F0922A    F1008A    F1103A    L0522016  L072701A  L080401A
     L033103A  L040403A

              PROGRAM TAPER2(NTAPES)                                                          TAPER2         1
        *                                                                                     TAPER2         2
        *     THIS PROGRAM, GIVEN A TIME AND SPACE WINDOW, AND A REQUIRED                     TAPER2         3
        *       OUTPUT TIME INTERVAL, WILL PROVIDE DATA FROM FNWC GENERATED                   TAPER2         4
        *       TAPES.                                                                        TAPER2         5
        *     THE FILE ALLOCATION IS AS FOLLOWS                                               TAPER2         6
        *       61-69    INPUT TAPES                                                          TAPER2         7
        *       31-50    DATA IN SPACE-TIME WINDOW (ANY TIME INTERVAL)                        TAPER2         8
        *       71       OUTPUT FILE                                                          TAPER2         9
        *                                                                                     TAPER2        10
        $CALL AATAPE                                                                          TAPER2        11
        *                                                                                     TAPER2        12
              PARAMETER NCATP=17                                                              TAPER2        13
        *                                                                                     TAPER2        14
              REAL*4 D(63,63,NCATP)                                                           TAPER2        15
             , , DZ(63,63,2)                                                                  F0909A         3
              DATA CATNO/'AAAZ','AABZ','AACZ','AADZ','AAEZ','AAFZ','AAIZ','AAQZ'              TAPER2        16
             , , 'AARZ','AASZ','AATZ','AAUZ','AAVZ','AAWZ','AAXZ','AAYZ','AAZZ'/              TAPER2        17
             , , INDEX/NCATP*0/                                                               TAPER2        18
        *                                                                                     TAPER2        19
              NAMELIST/ONE/YEAR,MONTH,DAY,HOUR,IS,IE,JS,JE,NT,DT                              TAPER2        20
             , , CHKNED,NODISC,SUMMRY                                                         L0522016       3
             , , NCATST,CATNO,SIGNAD                                                          L033103A       3
        *                                                                                     TAPER2        22
              CALL RSSTOP                                                                     TAPER2        23
        *                                                                                     TAPER2        24
              NCATNO=NCATP                                                                    TAPER2        25
        *                                                                                     TAPER2        26
              DO 10 N=1,NCATNO                                                                TAPER2        27
           10 SORT(N)=.FALSE.                                                                 TAPER2        28
              ABTRN=.FALSE.                                                                   TAPER2        29
              LU=5                                                                            TAPER2        30
              CHKNED=.FALSE.                                                                  TAPER2        31
              NODISC=.FALSE.                                                                  F1008A         7
              SUMMRY=.FALSE.                                                                  L0522016       5
              NCATST=0                                                                        L080401A       5
              SIGNAD=.FALSE.                                                                  L033103A       5
              READ(LU,ONE)                                                                    TAPER2        32
              IF (NCATST.NE.0) NCATNO=NCATST                                                  L080401A       7
              IF (CHKNED .OR. SUMMRY) GO TO 25                                                L0522016       7
        *                                                                                     TAPER2        33
        *     DO DATA CHECK                                                                   TAPER2        34
        *                                                                                     TAPER2        35
              IF (YEAR.LT.85 .AND.  YEAR .GT.65          .AND.                                TAPER2        36
             .    MONTH.GE.1  .AND.  MONTH.LE.12          .AND.                               TAPER2        37
             .    DAY  .GE.1  .AND.  DAY  .LE.31          .AND.                               TAPER2        38
             .    HOUR .GE.0  .AND.  HOUR .LE.24          .AND.                               TAPER2        39
             .    IS   .GE.1  .AND.  IS   .LE.62          .AND.                               TAPER2        40
             .    IE   .GE.2  .AND.  IE   .LE.63          .AND.                               TAPER2        41
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      .   JS   .GE.1  .AND.  JS   .LE.62        .AND.       TAPER2     42
      .   JE   .GE.2  .AND.  JE   .LE.63        .AND.       TAPER2     43
      .   NT   .GE.1  .AND.  NT   .LE.1000      .AND.       F1103A      3
      .   DT   .GE.1. .AND.  DT   .LE.24.)                  F0731B      3
      . GO TO 20                                            TAPER2     46
      WRITE (6,ONE)                                         TAPER2     47
      CALL STOPP("ERROR IN DATA ENTRY")                     TAPER2     48
   20 CONTINUE                                              TAPER2     49
*                                                           TAPER2     50
*     FIND STARTING TIME                                    TAPER2     51
*                                                           TAPER2     52
      KS=(((YEAR*100)+MONTH)*100+DAY)*100+HOUR              TAPER2     53
*                                                           TAPER2     54
*     FIND ENDING TIME                                      TAPER2     55
*                                                           TAPER2     56
      IT=IFIX(FLOAT(NT-1) * DT)                             TAPER2     57
      KE=TIMEA(KS,IT)                                       TAPER2     58
*                                                           TAPER2     59
*     READ TAPES, WRITE OUT INFORMATION TO DIFFERENT FILES FOR ALL    TAPER2     60
*       DATA IN THE TIME-SPACE WINDOW.                      TAPER2     61
*                                                           TAPER2     62
   25 CONTINUE                                              L0522816    9
      ITYPE=4                                               F0911A      3
      CALL NEDMC(NTAPES,ITYPE,D2,D2(1,1,2))                 F0911A      4
*                                                           TAPER2     64
      DO 30 N=1,NCATNO                                      TAPER2     65
      NF=30 + N                                             TAPER2     66
      REWIND NF                                             TAPER2     67
   30 CONTINUE                                              TAPER2     68
*                                                           TAPER2     69
*     SEE IF EVERYTHING IS IN THE CORRECT ORDER             TAPER2     70
*                                                           TAPER2     71
      DO 200 N=1,NCATNO                                     TAPER2     72
      IF (.NOT.SORT(N)) GO TO 200                           TAPER2     73
      CALL FSORT(30+N,54,DTIMES(1,N),D,IS,IE,JS,JE,INDEX(N))    F0922A      3
  200 CONTINUE                                              TAPER2     77
*                                                           TAPER2     78
      NTREAL=INDEX(1)                                       F0731B      5
      DO 250 N=2,NCATNO                                     TAPER2     79
      IF (INDEX(N).EQ.INDEX(1)) GO TO 250                   TAPER2     80
      GO TO 260                                             TAPER2     81
  250 CONTINUE                                              TAPER2     82
      GO TO 280                                             TAPER2     83
  260 PRINT 932                                             TAPER2     84
  932 FORMAT ("  WARNING:  THERE ARE NOT AN EQUAL NUMBER OF EOTS"    TAPER2     85
     . , " PARAMETERS IN EACH CATAGORY.")                   TAPER2     86
      DO 270 N=2,NCATNO                                     TAPER2     88
  270 IF (INDEX(N).LT.NTREAL) NTREAL=INDEX(N)               TAPER2     89
  280 CONTINUE                                              TAPER2     90
*                                                           TAPER2     91
*                                                           TAPER2     92
      DO 500 NI=1,NTREAL                                    TAPER2     93
*                                                           TAPER2     94
      DO 300 N=1,NCATNO                                     TAPER2     95
      NF=30 + N                                             TAPER2     96
  300 READ(NF,END=310) ((D(I,J,N),I=IS,IE),J=JS,JE)         TAPER2     97
      GO TO 320                                             TAPER2     98
  310 ENCODE (80,930,LABEL) N                               TAPER2     99
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      930 FORMAT('TAPER HIT AN END OF FILE FOR CAT NO ',I2,'$')     TAPER2   100
          GO TO 1000                                                TAPER2   101
      320 CONTINUE                                                  TAPER2   102
    *                                                               TAPER2   103
          DO 330 N=2,NCATNO                                         TAPER2   104
          IF (DTIMES(N1,1) .EQ. DTIMES(N1,N)) GO TO 330             TAPER2   105
          GO TO 340                                                 TAPER2   106
      330 CONTINUE                                                  TAPER2   107
    *                                                               TAPER2   108
    *     EVERYTHING IS OK                                          TAPER2   109
    *                                                               TAPER2   110
          GO TO 440                                                 TAPER2   111
      340 CONTINUE                                                  TAPER2   112
    *                                                               TAPER2   113
    *     ALL TIMES ARE NOT EQUAL                                   TAPER2   114
    *                                                               TAPER2   115
          TIME=DTIMES(N1,1)                                         TAPER2   116
          DO 400 N=2,NCATNO                                         TAPER2   117
      400 IF (DTIMES(N1,N) .GT. TIME) TIME=DTIMES(N1,N)             TAPER2   118
    *                                                               TAPER2   119
          DO 430 N=1,NCATNO                                         TAPER2   120
          IF (DTIMES(N1,N) .EQ. TIME) GO TO 430                     TAPER2   121
    *                                                               TAPER2   122
      410 CONTINUE                                                  TAPER2   123
    *                                                               TAPER2   124
    *     THIS FILE HAS A TIME THAT IS TOO EARLY, SO SHIFT          TAPER2   125
    *                                                               TAPER2   126
          NF=30 + N                                                 TAPER2   127
          READ(NF,END=310) ((D(I,J,N),I=IS,IE),J=JS,JE)             TAPER2   128
          NS=N1                                                     TAPER2   129
          INDEX(N)=INDEX(N) - 1                                     TAPER2   130
          NE=INDEX(N)                                               TAPER2   131
          DO 420 NN=NS,NE                                           TAPER2   132
      420 DTIMES(NN,N)=DTIMES(NN+1,N)                               TAPER2   133
    *                                                               TAPER2   134
          PRINT 934,N                                               TAPER2   135
      934 FORMAT (' FILE ',I2,' WILL BE SKIPPED ONE ENTRY')         TAPER2   136
    *                                                               TAPER2   137
          IF (DTIMES(N1,N) .EQ. TIME) GO TO 430                     TAPER2   138
          IF (DTIMES(N1,N) .LT. TIME) GO TO 410                     TAPER2   139
    *                                                               TAPER2   140
          ENCODE(80,931,LABEL) TIME,N                               TAPER2   141
      931 FORMAT('FILE AT CORRECT TIME (',I8,') CANNOT BE FOUND FOR CAT NO '   TAPER2   142
         * , I2,'$')                                                TAPER2   143
          GO TO 1000                                                TAPER2   144
    *                                                               TAPER2   145
      430 CONTINUE                                                  TAPER2   146
    *                                                               TAPER2   147
    *                                                               TAPER2   148
      440 CONTINUE                                                  TAPER2   149
    *                                                               TAPER2   150
    *     WRITE OUT                                                 TAPER2   151
    *                                                               TAPER2   152
          IF (NODISC) GO TO 470                                     F1000A     9
          I=DTIMES(N1,1)                                            TAPER2   153
          J=JULIAN(I)                                               TAPER2   154
          MR=MOD(I,100)                                             TAPER2   155
          I=I/100                                                   TAPER2   156
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      DAY=MOD(I,100)                                              TAPER2    157
      I=I/100                                                     TAPER2    158
      MO=MOD(I,100)                                               TAPER2    159
      YR=I/100                                                    TAPER2    160
      IR=IE - IS + 1                                              TAPER2    161
      JR=JE - JS + 1                                              TAPER2    162
*                                                                 L033103A    7
      IF (SIGMOD) GO TO 465                                       L033103A    8
*                                                                 L033103A    9
      IF (N1.EQ.1) WRITE(71) NTREAL,J,YR,MO,DAY,HR,IS,IR,JS,JR    TAPER2    163
                   WRITE(71)        J,YR,MO,DAY,HR,IS,IR,JS,JR    F1000A     11
*                                                                 TAPER2    165
      DO 460 J=JS,JE                                              TAPER2    166
  460 WRITE(71) ((D(I,J,N),N=1,NCATNO),I=IS,IE)                   TAPER2    167
*                                                                 F1000A     13
      GO TO 500                                                   F1000A     14
*                                                                 L033103A   11
*     SIGMA CODE OUTPUT                                           L033103A   12
*                                                                 L033103A   13
  465 CONTINUE                                                    L033103A   14
*                                                                 L033103A   15
      WRITE (71) NCATNO,IS,IR,JS,JR,J,YR,MO,DAY,HR                L033103A   16
*                                                                 L033103A   17
      DO 467 N=1,NCATNO                                           L033103A   18
      WRITE (71) CATNO(N)                                         L033103A   19
      WRITE (71) ((D(I,J,N),I=IS,IE),J=JS,JE)                     L033103A   20
  467 CONTINUE                                                    L033103A   21
*                                                                 L033103A   22
      GO TO 500                                                   L033103A   23
  470 CONTINUE                                                    F1000A     15
      DO 480 N=1,NCATNO                                           F1000A     16
      WRITE (LUO,926) CATNO(N),DTIMES(N1,1)                       F1000A     17
  480 CALL FPRT(D(1,1,N),IS,IE,JS,JE,2,0)                         F1000A     18
  926 FORMAT (////,10X,"CATALOG NUMBER ",A4," AT TIME ",I8," IST",//) F1000A 19
*                                                                 TAPER2    168
  500 CONTINUE                                                    TAPER2    169
*                                                                 TAPER2    170
      IF (NTREAL .LT. 2) GO TO 525                                L040403A    3
      DO 520 N=2,NTREAL                                           TAPER2    171
      I=TIMES( DTIMES(N,1),DTIMES(N-1,1) )                        TAPER2    172
      IF (FLOAT(I).LE.DT) GOTO 520                                TAPER2    173
      II=TIMEA(DTIMES(N-1,1),IFIX(DT))                            TAPER2    174
      PRINT 933,II                                                TAPER2    175
  933 FORMAT(" MISSING EOTS FIELDS AT TIMES ",I8)                 TAPER2    176
  520 CONTINUE                                                    TAPER2    177
  525 CONTINUE                                                    L040403A    5
*                                                                 TAPER2    178
*                                                                 TAPER2    179
*     SUMMARY LISTING                                             TAPER2    180
*                                                                 TAPER2    181
      GO TO 1010                                                  TAPER2    182
 1000 ABTHM=.TRUE.                                                TAPER2    183
 1010 LUO=6                                                       TAPER2    184
      NTM1=NT - 1                                                 TAPER2    185
      WRITE (LUO,921) KS,KE,IS,IE,JS,JE,NTM1,DT                   TAPER2    186
      DO 1100 N=1,NCATNO                                          TAPER2    187
      WRITE (LUO,923) N,CATNO(N),INDEX(N),SORT(N)                 TAPER2    188
 1100 CONTINUE                                                    TAPER2    189
```

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      921 FORMAT("1",20X,20(1H*),"   TAPE R(EAD) SUMMARY LISTING   ",20(1H*)   TAPER2  190
     . . //,10X,"THE TIME WINDOW RUNS FROM ",I8," TO ",I8,",              TAPER2  191
     . . /,10X,"AND THE SPACE WINDOW RUNS FROM I=",I2," TO "               TAPER2  192
     . . I2,",  AND J=",I2," TO ",I2,"."                                    TAPER2  193
     . . //,10X,I2," INTERVALS OF ",F4.1," HOURS WERE REQUESTED."          TAPER2  194
     . . ///,T15,"#",T25,"CATALOG NO",T39,"# OF ENTRIES"                    TAPER2  195
     . . T54,"NEEDS SORTING",T71,"ORDER OUT"                                TAPER2  196
     . . T86,"SCALED BY"                                                    TAPER2  197
     . . //)                                                                TAPER2  198
      923 FORMAT (T14,I2,T20,A4,T42,I3,T60,L1                              TAPER2  199
     . . T74,I2,T85,1PE10.3                                                 TAPER2  200
     . )                                                                    TAPER2  201
          IF (ABTRM) CALL STOPP(LABEL)                                      TAPER2  202
 *                                                                          TAPER2  203
 *                                                                          TAPER2  204
          STOP                                                              TAPER2  205
          END                                                               TAPER2  206
```

240 ACTIVE LINE(S)   13 INACTIVE LINE(S)

Appendix C

Plotting Routines

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SMS VERSION 5.27    LISTING OF DECK    C O N I N T                                        01/12/84          PAGE 1

*** SMS109 : DECK CONINT   IS EDITED FROM SPL      FILE
CREATED ON 08/01/83 AT 11:06:24          LAST UPDATED ON 08/01/83 AT 11:06:24 BY SMS VERSION 5.27
LANGUAGE:            USER INFORMATION:

        1          SUBROUTINE CONINT(X,Y,N,S1,S2)                                              CONINT        1
        2          DIMENSION X(N),Y(N)                                                         CONINT        2
        3          COMMON/CINT1/CVALUE                                                         CONINT        3
        4          CALL CONCRV(X,Y,N,CVALUE)                                                   CONINT        4
        5          RETURN                                                                      CONINT        5
        6          END                                                                         CONINT        6

               6 ACTIVE LINE(S)             0 INACTIVE LINE(S)

 E NSLAB
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*** SMS109 : DECK HSLAB    IS EDITED FROM SPL      FILE
CREATED ON 08/27/80 AT 16:13:45          LAST UPDATED ON 08/08/83 AT 12:23:33 BY SMS VERSION 5.27
LANGUAGE:            USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F0027B    F0027D    F0029A    F0029B    F1103C    F010601E  L092702A  L000103A  L000103B
     L000103C  L000203A  L000303A  L000503A  L000603A  L000603B  L000603C  L000603D  L000803A

          SUBROUTINE HSLAB(T,IF,JF,ZB,IZB,JZB,L,P                                     F0027B       3
         . , LABEL,ISTP,NPLOT,PAPERP,IRUN)                                            F010601E     3
 *                                                                                    HSLAB        3
 *        THIS ROUTINE PLOTS A HORIZONTAL SLAB OF A DATA QUANTITY                     HSLAB        4
 *                                                                                    HSLAB        5
          PARAMETER ISIZE=40,JSIZE=30                                                 L092702A     3
          REAL*4 L                                                                    HSLAB        7
          EXTERNAL CONINT                                                             L000103B     3
          DIMENSION T(IF,JF),L(IF),P(JF),ZB(IZB,JZB)                                  F0027B       5
         . , CON(40),CONZ(20)                                                         F0029A       3
         . , LABEL(4),DEGL(ISIZE),DEGP(JSIZE)                                         HSLAB       10
          INTEGER  NTIT(20),PATIT(4)                                                  HSLAB       11
          COMMON WORK(5000)                                                           L000103A     3
          COMMON/CINT1/CVALUE                                                         L000103A     4
          LOGICAL PAPERP                                                              L000103A     5
 *                                                                                    HSLAB       12
          NAMELIST/PLTDT4/M,ISEP,NLINE,AMAG,XL,XU,YL,YU,NTIK,NCON,ZU,ZL               HSLAB       13
         . , NCONZ,ZDEL,ZDZU                                                          HSLAB       14
         . , CHMIN,CHANG                                                              L000803A     3
 *                                                                                    HSLAB       15
          IF (IF.GT.ISIZE .OR. JF.GT.JSIZE)                                           F0027B       7
         .CALL STOPP("ARRAYS TOO SMALL IN HSLAB$")                                    F0027B       8
 *                                                                                    HSLAB       18
          IF (ISTP.NE.0) GO TO 80                                                     HSLAB       19
 *                                                                                    HSLAB       20
 *        DO INITILIZIATION                                                           HSLAB       21
 *                                                                                    HSLAB       22
          CONST=57.29578                                                              HSLAB       23
          DO 10 I=1,IF                                                                F0027B      10
       10 DEGL(I)=L(I) * CONST                                                        HSLAB       25
 *                                                                                    HSLAB       26
          DO 20 J=1,JF                                                                F0027B      12
       20 DEGP(J)=P(J) * CONST                                                        HSLAB       28
 *                                                                                    HSLAB       29
 *        SET DEFAULTS                                                                HSLAB       30
 *                                                                                    HSLAB       31
          M=100.                                                                      HSLAB       32
          ISEP=1                                                                      HSLAB       33
          NLINE=0                                                                     HSLAB       34
          AMAG=1.                                                                     HSLAB       35
          CHMIN=1.5                                                                   L000803A     5
          CHANG=50.                                                                   L000803A     6
 *                                                                                    HSLAB       36
 *        PLACE BOUNDARIES CORRECTLY                                                  HSLAB       37
 *                                                                                    HSLAB       38
          IFM1=IF - 1                                                                 F0027D       3
          JFM1=JF - 1                                                                 F0027D       4
          XL=(DEGL(1    ) + DEGL(2    )) * .5                                         HSLAB       39
          XU=(DEGL(IFM1) + DEGL(IF   )) * .5                                          HSLAB       40
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      YL=(DEGP(1   ) + DEGP(2   ))  *  .5                                  HSLAB      41
      YU=(DEGP(JFM1) + DEGP(JF  ))  *  .5                                  HSLAB      42
      NTIK=5                                                               HSLAB      43
      NCON=3                                                               HSLAB      44
      ZU=1.                                                                HSLAB      45
     'ZL=-1.                                                               HSLAB      46
      NCONZ=0                                                              F00290      3
      ZBZL=-1.                                                             L000603A    3
      ZBZU=-1.                                                             L000603A    4
      ZBZLP=0.                                                             L000603A    5
      ZBZUP=0.                                                             L000603D    4
      READ (5,PLTDT4)                                                      HSLAB      50
      DO 25 I=1,IF                                                         L000603B    3
      DO 25 J=1,JF                                                         L000603B    4
      IF (DEGL(I).LT.XL .OR. DEGL(I).GT.XU) GO TO 25                       L000603C    3
      IF (DEGP(J).LT.YL .OR. DEGP(J).GT.YU) GO TO 25                       L000603C    4
      ZBZUP=AMAX1(ZBZUP,ZB(I,J))                                           L000603A   12
      ZBZLP=AMIN1(ZBZLP,ZB(I,J))                                           L000603D    6
   25 CONTINUE                                                             L000603A   13
*                                                                          L000603A   14
      IF (ZBZU .LT. 0.) ZBZU=ZBZUP                                         L000603A   15
      IF (ZBZL .LT. 0.) ZBZL=ZBZLP                                         L000603D    8
*                                                                          L000603D    9
      IF (NLINE.EQ.0) NLINE=ISEP + 42                                      HSLAB      51
      IF (NCON.GT.40 .OR. NCONZ.GT.20)                                     F0029A      5
     *CALL STOPP("YOU HAVE ASKED FOR TOO MANY CONTOURS IN HSLAB$")         F0029A      6
*                                                                          HSLAB      52
      XC=1. / FLOAT(NCON - 1)                                              HSLAB      53
      DO 30 N=1,NCON                                                       HSLAB      54
   30 CON(N)=( ZU * FLOAT(N-1) + ZL * FLOAT(NCON-N) ) * XC                 HSLAB      55
*                                                                          HSLAB      56
      IF (NCONZ.LE.0) GO TO 45                                             F00290      5
      XC=1. / FLOAT(NCONZ - 1)                                             HSLAB      57
      DO 40 N=1,NCONZ                                                      HSLAB      58
   40 CONZ(N)=( ZBZU * FLOAT(N-1) + ZBZL * FLOAT(NCONZ-N) ) * XC           HSLAB      59
*                                                                          HSLAB      60
      IF (PAPERP) GO TO 43                                                 L000503A    3
*                                                                          L000503A    4
      CALL BGNPL(NPLOT)                                                    L000503A    5
      CALL BASALF("L/CSTAN")                                               L000503A    6
      CALL MIXALF("STAND")                                                 L000503A    7
      CALL BLOWUP(1.25)                                                    L000503A    8
      CALL NOCHEK                                                          L000503A    9
      CALL GRACE(0.)                                                       L000503A   10
*                                                                          L000503A   11
      XTIT=9.                                                              L000503A   12
      YTIT=5.                                                              L000503A   13
      CALL TITLE(1H ,-1,0,0,0,0,XTIT,YTIT)                                 L000503A   14
      CALL ENDGR(1)                                                        L000503A   15
      CALL OREL(0.,1.)                                                     L000503A   16
      CALL TITLE("DEPTH$",-100,"LONGITUDE$",100,"LATITUDE$",100            L000503A   17
     * , XTIT,YTIT)                                                        L000503A   18
      CALL GRAF(XL,"SCALE",XU,YL,"SCALE",YU)                               L000503A   19
      CALL FRAME                                                           L000503A   20
      CALL BCOMON(5000)                                                    L000503A   21
*                                                                          L000503A   22
      CALL CONMIN(CMMIN)                                                   L000803A    8
      CALL CONANG(CHANG)                                                   L000803A    9
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      CALL CONLIN(0,'SOLID',  'LABELS',1,1)                         L000583A   25
      CALL CONLIN(1,'SOLID','NOLABELS',1,1)                         L000583A   26
      CALL CONNGN                                                   L000583A   27
      DO 42 N=1,NCONZ                                               L000583A   28
      CVALUE=CONZ(N)                                                L000583A   29
      CALL CNTOUR(ZB,IZB,DEGL,1,IF,DEGP,1,JF,CONZ(N),CONINT,TT)     L000583A   30
   42 CONTINUE                                                      L000583A   31
*                                                                   L000583A   32
      CALL CONEND                                                   L000583A   33
      CALL CONTUR(1,'LABELS','DRAW')                                L000583A   34
*                                                                   L000583A   35
      CALL ENDPL(NPLOT)                                             L000583A   36
      GO TO 45                                                      L000583A   37
*                                                                   L000583A   38
   43 CONTINUE                                                      L000583A   39
*                                                                   L000583A   40
      CALL CONTOR(ZB,IZB,DEGL,DEGP,IF,JF,CONZ,NCONZ                 MSLAB      41
     * , ISEP,NLINE,AMAG                                            MSLAB      62
     * , XL,XU,YL,YU,6,NTIK                                         MSLAB      63
     * , DUM,DUM,0,0.,1.                                            MSLAB      64
     * , DUM,DUM,DUM,DUM,DUM,DUM,DUM                                F0029A      8
     * , 'DEPTH$','LONGITUDE$',' $',' $',' $')                      MSLAB      65
   45 CONTINUE                                                      F0029B      7
*                                                                   MSLAB      66
      RETURN                                                        MSLAB      67
*                                                                   MSLAB      68
   80 CONTINUE                                                      MSLAB      69
*                                                                   MSLAB      70
      READ (3) T                                                    MSLAB      71
*                                                                   MSLAB      72
*     DO PLOTTING                                                   MSLAB      73
*                                                                   MSLAB      74
      IF (NCON.EQ.0) GO TO 600                                      L000583A   42
      ENCODE(80,970,NTIT) LABEL,ISTP,IRUN                           F0106B1E    5
      ENCODE (16,971,PXTIT)                                         MSLAB      76
  970 FORMAT(4A6,' AT TIME STEP ',I4,'   (RUN #',I3,')$')           F0106B1E    7
  971 FORMAT (' LONGITUDE $')                                       MSLAB      78
      IF (PAPERP) GO TO 500                                         L000103A    7
*                                                                   L000103A    8
*                                                                   L000103A    9
      CALL BGNPL(NPLOT)                                             L000103A   10
      CALL BASALF('L/CSTAN')                                        L000103A   11
      CALL MIXALF('STAND')                                          L000103A   12
      CALL BLOWUP(1.25)                                             L000103A   13
      CALL NOCHEK                                                   L000103A   14
      CALL GRACE(0.)                                                L000103A   15
*                                                                   L000103A   16
      XTIT=9.                                                       L000103C    3
      YTIT=5.                                                       L000103C    4
      CALL TITLE(1H ,-1,0,0,0,0,XTIT,YTIT)                          L000103C    5
      CALL ENDGR(1)                                                 L000103C    6
      CALL OREL(0.,1.)                                              L000103C    7
      CALL TITLE(NTIT,-100,'LONGITUDE$',100,'LATITUDE$',100         L000103C    8
     * , XTIT,YTIT)                                                 L000103C    9
      CALL GRAF(XL,'SCALE',XU,YL,'SCALE',YU)                        L000383A    3
      CALL FRAME                                                    L000103A   20
      CALL BCOMON(5000)                                             L000103A   21
*                                                                   L000103A   22
```

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SAS VERSION 5.27    LISTING OF DECK    H S L A B                                   01/12/84       PAGE 4

          CALL CONMIN(3.)                                                          L000103C     11
          CALL CONANG(5.)                                                          L000103C     12
          CALL CONLIN(0,'SOLID',  'LABELS',1,1)                                    L000103C     13
          CALL CONLIN(1,'SOLID','NOLABELS',1,1)                                    L000103C     14
          CALL CONAGN                                                              L000103A     23
          DO 100 N=1,NCON                                                          L000103A     24
          CVALUE=CON(N)                                                            L000103A     25
          CALL CNTOUR(T,IF,DEGL,1,IF,DEGP,1,JF,CON(N),CONINT,TT)                   L000103A     26
      100 CONTINUE                                                                 L000103A     27
*                                                                                  L000103A     28
          CALL CONEND                                                              L000103A     29
          CALL CONTUR(1,'LABELS','DRAW')                                           L000103A     30
*                                                                                  L000103A     31
          CALL ENDPL(NPLOT)                                                        L000103A     32
          GO TO 600                                                                L000203A      3
*                                                                                  L000103A     33
      500 CONTINUE                                                                 L000103A     34
*                                                                                  HSLAB        79
          CALL CONTOR(T,IF,DEGL,DEGP,IF,JF,CON,NCON                                F00270       14
     * *  ISEP,NLINE,ANAG                                                          HSLAB        01
     * *  XL,XU,YL,YU,6,NTIK                                                       HSLAB        02
     * *  DUM,DUM,0,0.,1.                                                          HSLAB        03
     * *  DUM,DUM,DUM,DUM,DUM,DUM,DUM                                              F0029A       10
     * *  NTIT,PXTIT,' 0',' 0',' 0')                                               HSLAB        04
*                                                                                  HSLAB        05
      600 CONTINUE                                                                 L000203A      5
*                                                                                  HSLAB        06
          RETURN                                                                   HSLAB        07
          END                                                                      HSLAB        08

          194 ACTIVE LINE(S)          26 INACTIVE LINE(S)

0E OCPLOT
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*** SMS189 : DECK OCPLOT   IS EDITED FROM SPL      FILE
CREATED ON 08/16/79 AT 16:29:22          LAST UPDATED ON 07/27/83 AT 15:21:09 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F255B    F256A    F256B    F257A    F261A    F261C    F263B    F268A    F269B
     F275A    F276A    F282A    F283A    F283B    F284A    F285C    F0111D   F0114A   F0114D   F0515F   F0521C
     F0521G   F0529C   F0529D   F0530E   F0714A   F0714B   F0731C   F0013C   F0014B   F0022A   F0027A   F0027B
     F0027C   F0916B   F1009G   F1229A   F1231A   F010601C F010601E L0915028 L0923028 L092402C L0411030 L072703C
     L0727030

         PROGRAM OCPLOT(ISW)                                                OCPLOT      1
         PARAMETER IS=40,JS=30,KS=10                                        L0915028    3
       . , IS2=IS + 2                                                       F261A       3
         DIMENSION D1(IS),D2(JS),D3(IS,JS,KS),D5(IS,JS),D6(IS,JS)           F275A       3
       . , D13(IS),D14(JS),ZT(IS,JS),ZS(IS,JS),ZC(IS,JS)                    F283A       3
       . , ZBOT(IS,JS)                                                      F0022A      3
         LOGICAL READT,READS,PAPERP/F/                                      F0521C      3
       . , TOPLAY                                                           F0530E      4
         REAL*4 LMIN,LMAX,LDIF                                              F0529D      3
         INTEGER PC(60),IB(60)                                              F0515F      3
         CALL RSSTOP                                                        OCPLOT      4
         READ (3) KF,DELT,PC,IB,NSTEP,XLSPCT,XPSPCT                         L0923028    3
         IRUN=KF / 1000                                                     F010601E    3
         KF=MOD(KF,1000)                                                    F010601E    4
         NSTEP0=NSTEP / 10000                                               L0411030    3
         NSTEP =MOD(NSTEP,10000)                                            L0411030    4
         NSTEP0=NSTEP0 + 1                                                  L0411030    5
         READ (2,910) LMIN,LMAX,PMIN,PMAX,IF,JF,XLSPAC,XPSPAC               L0923028    5
     910 FORMAT (4F7.1,2I7,1P2E10.3)                                        L0923028    6
         IF (XLSPCT.NE.XLSPAC .OR. XPSPCT.NE.XPSPAC) CALL STOPP             L0923028    7
        .(" MESH SPACING INCONSISTENT BETWEEN SIGMA RUN AND ZDATA $")        L0923028    8
   *                                                                        F0714A      3
   *     SPLIT UP HERE DEPENDING ON DATA TYPE                               F0714A      4
   *                                                                        F0714A      5
         IF (ISW.GT.10) GO TO 1000                                          F0714A      6
   *                                                                        F0714A      7
   *                                                                        F0714A      8
         IFP1=IF + 1                                                        OCPLOT      8
         JFP1=JF + 1                                                        OCPLOT      9
         IF (IFP1.GT.IS .OR. JFP1.GT.JS .OR. KF.GT.KS)                      F255B       11
        .CALL STOPP("ARRAYS ARE TOO SMALL IN OCPLOT$")                      F255B       12
         NPLOT=0                                                            F269B       3
   *                                                                        F261A       8
         DO 50 I=1,IF                                                       F261A       9
      50 READ(2,920) (ZBOT(I,J),J=1,JF)                                     F0022A      5
     920 FORMAT (10F7.1)                                                    F1009G      3
         DO 60 I=2,IF                                                       F261A       12
         DO 60 J=1,JF                                                       F261A       13
      60 D6(I,J)=ZBOT(I,J) + ZBOT(I-1,J)                                    F0022A      7
         DO 70 I=2,IF                                                       F261A       15
         DO 70 J=2,JF                                                       F261A       16
      70 D5(I,J)=(D6(I,J) + D6(I,J-1)) * .25                                F261A       17
         DO 80 J=2,JF                                                       F261A       18
         D5(1,J)=D5(3,J)                                                    F0114D      4
      80 D5(IFP1,J)=D5(IF-1,J)                                              F0114D      5
         DO 90 I=1,IFP1                                                     F261A       21
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        DS(I,1)=DS(I,3)                                          F01140     7
     90 DS(I,JFP1)=DS(I,JF-1)                                    F01140     8
*                                                                F0529C     3
*       SET UP THE MESH                                          F0529C     4
*        (NOTE:  THIS IS THE MESH LOCATED AT THE TS POINTS, AND IS F0529C   5
*                  NOT THE MESH FROM THE CODE.)                  F0529C     6
*                                                                F0529C     7
        CONST=1. / 57.29578                                      F0529C     8
        PRINT 950                                                L0923028  10
        CALL MESHST(D1,IFP1,LMIN,LMAX,XLSPAC,1)                  L0923028  11
        PRINT 951                                                L0923028  12
        CALL MESHST(D2,JFP1,PMIN,PMAX,XPSPAC,1)                  L0923028  13
        DO 93 I=1,IFP1                                           F0529C    17
     93 D1(I)=D1(I) * CONST                                      L0923028  15
        DO 96 J=1,JFP1                                           F0529C    19
     96 D2(J)=D2(J) * CONST                                      L092402C   3
*                                                                L0923028  18
    950 FORMAT (20X,"LONGITUDE MESH:")                           L0923028  19
    951 FORMAT (20X," LATITUDE MESH:")                           L0923028  20
        IF (ISW.NE.1 .AND. ISW.NE.2 .AND. ISW.NE.3)              F0521C     5
       .CALL STOPP("BAD VALUE OF LOAD TIME PARAMTER IN OCPLOTS") F2558     14
        IF (ISW.EQ.1 .OR. ISW.EQ.2) CALL COMPRS                  F0731C     3
        IF (ISW.EQ.3) PAPERP=.TRUE.                              F0521C     7
        ISTP=0                                                   F261A     25
        CALL SURFT(D6,D13,D14,IFP1,JFP1,LMIN,LMAX,PMIN,PMAX,ISTP F0114A     3
       . , NPLOT,DS,IS,JS,IRUN,XLSPAC,XPSPAC)                    L0923028  22
        CALL STSLCE(IFP1,JFP1,KF,D1,LMIN,LMAX,D2,PMIN,PMAX       F276A      3
       . , DS,IS,JS,DELT,IRUN)                                   F010601E   8
        CALL SETVP(D1,IFP1,D2,JFP1,DS,IS,JS,KF,DELT,IRUN)        F010601E  10
        CALL HSLICE(D3,IF,JF,KF,ZBOT,DS,IS,JS,D1,IFP1,D2,JFP1    F0022A     9
       . , "   (P)RESSURE   ",ISTP,NPLOT,DELT,PAPERP,IRUN)       F010601E  12
*                                                                F2558     18
*       IN THE CALLS TO SLICE THE LAST 6 ARGUMENTS ARE:  PLOT NUMBER, F203A  6
*         DELT, WHICH DERIVATIVE=0 AT THE BOTTOM, STEP NUMBER, DATA F203A   7
*         TYPE,  AND THE OPERATION TO BE PERFORMED.              F203A      8
*                                                                F2558     19
        TOPLAY=.TRUE.                                            F0530E     6
        DO  200 ISTP=NSTEP0,NSTEP                                L0411030   7
        READT=.FALSE.                                            F203A     10
        READS=.FALSE.                                            F203A     11
*                                                                F2558     22
        IF (PC(13).EQ.0) GO TO 100                               F2558     23
        IF (MOD(ISTP,PC(13)).EQ.0 .AND. ISTP.GE.IB(13))          F2558     24
       .CALL SURFT(D6,D13,D14,IFP1,JFP1,LMIN,LMAX,PMIN,PMAX,ISTP,NPLOT F0114A 6
       . , DS,IS,JS,IRUN,XLSPAC,XPSPAC)                          L0923028  24
    100 CONTINUE                                                 F2558     26
*                                                                F2558     27
        IF (PC(17).EQ.0) GO TO 120                               F2558     28
        IF (MOD(ISTP,PC(17)).NE.0 .OR. ISTP.LT.IB(17)) GO TO 120 F203A     13
        CALL SLICE(D3,IFP1,JFP1,KF,D1,D2,ZT,"  (T)EMPERATURE ",NPLOT F203A 14
       . , DELT,1,ISTP,1,1,PAPERP,TOPLAY)                        F0530E     8
        READT=.TRUE.                                             F203A     16
        CALL VPRFL(D3,IFP1,JFP1,KF,"  (T)EMPERATURE "            F205C      5
       . , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                      F0521C    14
    120 CONTINUE                                                 F2558     33
*                                                                F2558     34
        IF (PC(18).EQ.0) GO TO 130                               F2558     35
        IF (MOD(ISTP,PC(18)).NE.0 .OR. ISTP.LT.IB(18)) GO TO 130 F203A     18
```

```
      CALL SLICE(D3,IFP1,JFP1,KF,D1,D2,ZS,"   (S)ALINITY   ",NPLOT      F203A      19
     * , DELT,1,ISTP,2,1,PAPERP,TOPLAY)                                  F0530E     18
      READS=.TRUE.                                                       F203A      21
      CALL VPRFL(D3,IFP1,JFP1,KF,"   (S)ALINITY   "                      F205C      8
     * , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                                F0521C     18
  130 CONTINUE                                                           F2558      39
*                                                                        F2558      40
      IF (PC(12).EQ.0) GO TO 140                                         F2558      41
      IF (MOD(ISTP,PC(12)).NE.0 .OR. ISTP.LT.IB(12)) GO TO 140           F203B      3
      IF (.NOT.READT)                                                    F203A      24
     .CALL SLICE(D3,IFP1,JFP1,KF,D1,D2,ZT,0,0,DELT,1,ISTP,1,2            F0521C     20
     * , PAPERP,TOPLAY)                                                  F0530E     12
      IF (.NOT.READS)                                                    F203A      26
     .CALL SLICE(D3,IFP1,JFP1,KF,D1,D2,ZS,0,0,DELT,1,ISTP,2,2            F0521C     23
     * , PAPERP,TOPLAY)                                                  F0530E     14
      CALL SSPEED(ZT,ZS,IFP1,JFP1,ZC)                                    F284A      3
      CALL SLICE(D3,IFP1,JFP1,KF,D1,D2,ZC,"(S)OUND (S)PEED "             F203A      29
     * , NPLOT,DELT,2,ISTP,3,3,PAPERP,TOPLAY)                            F0530E     16
  140 CONTINUE                                                           F2558      45
*                                                                        F0013C     3
      IF (PC(31).EQ.0) GO TO 150                                         F0013C     4
      IF (MOD(ISTP,PC(31)).NE.0 .OR. ISTP.LT.IB(31)) GO TO 150           F0013C     5
      CALL HSLICE(D3,IF,JF,KF,ZBOT,DS,IS,JF,D1,IFP1,D2,JFP1              F0022A     11
     * , "   (P)RESSURE   ",ISTP,NPLOT,DELT,PAPERP,IRUN)                 F0106B1E   16
  150 CONTINUE                                                           F0013C     8
*                                                                        F2558      46
  200 CONTINUE                                                           F2558      47
      IF (.NOT.PAPERP) CALL DONEPL                                       F0521G     3
      STOP                                                               OCPLOT     11
*                                                                        F0714A     12
*     FOR U-V TYPE DATA                                                  F0714A     13
*                                                                        F0714A     14
 1000 CONTINUE                                                           F0714A     15
      ISW=MOD(ISW,10)                                                    F0714A     16
*                                                                        F0714A     17
*                                                                        F0714A     18
      IF (IF.GT.IS .OR. JF.GT.JS .OR. KF.GT.KS)                          F0714A     19
     .CALL STOPP("ARRAYS ARE TOO SMALL IN OCPLOT$")                      F0714A     20
      NPLOT=0                                                            F0714A     21
*                                                                        F0714A     22
      DO 1050 I=1,IF                                                     F0714A     23
 1050 READ (2,920) (US(I,J),J=1,JF)                                      F0714A     24
*                                                                        F0714A     25
*     SET UP THE MESH                                                    F0714A     26
*                                                                        F0714A     27
      CONST=1. / 57.29578                                                F0714A     28
      ALMIN=LMIN * CONST                                                 F0714A     29
      ALMAX=LMAX * CONST                                                 F0714A     30
      APMIN=PMIN * CONST                                                 F0714A     31
      APMAX=PMAX * CONST                                                 F0714A     32
      PDIF=APMAX - APMIN                                                 F0714A     33
      LDIF=ALMAX - ALMIN                                                 F0714A     34
      XIFMI=1. / (IF - 2.)                                               F0714A     35
      XJFMI=1. / (JF - 2.)                                               F0714A     36
      DO 1095 I=1,IF                                                     F0714A     37
 1095 D1(I)=ALMIN + LDIF * (FLOAT(I)-1.5) * XIFMI                        F0714A     38
      DO 1096 J=1,JF                                                     F0714A     39
 1096 D2(J)=APMIN + PDIF * (FLOAT(J)-1.5) * XJFMI                        F0714A     40
```

```
      IF (ISW.NE.1 .AND. ISW.NE.2 .AND. ISW.NE.3)                        F0714A    41
     .CALL STOPP('BAD VALUE OF LOAD TIME PARAMTER IN OCPLOTS')           F0714A    42
      IF (ISW.EQ.1 .OR. ISW.EQ.2) CALL COMPRS                            F0731C     5
      IF (ISW.EQ.3) PAPERP=.TRUE.                                        F0714A    45
      CALL SURFT(D6,D13,D14,IFP1,JFP1,LMIN,LMAX,PMIN,PMAX,-1             F0916B     3
     . , NPLOT,DS,IS,JS,IRUN,XLSPAC,XPSPAC)                              L0923828  26
      CALL STSLCE(IF,JF,KF,D1,LMIN,LMAX,D2,PMIN,PMAX                     F0714A    46
     . , DS,IS,JS,DELT,IRUN)                                             F010601E  20
      CALL SETVP(D3,IF,D2,JF,DS,IS,JS,KF,DELT,IRUN)                      F010601E  22
      ISTP=0                                                             F0027C     3
      CALL HSLAB(D3,IF,JF,DS,IS,JS,D1,D2                                 F0027C     4
     . , '          FLUX   ',ISTP,NPLOT,PAPERP,IRUN)                     F010601E  24
*                                                                        F0714A    49
*     IN THE CALLS TO SLICE THE LAST 6 ARGUMENTS ARE:  PLOT NUMBER,      F0714A    50
*       DELT, WHICH DERIVATIVE=0 AT THE BOTTOM, STEP NUMBER, DATA        F0714A    51
*       TYPE.  AND THE OPERATION TO BE PERFORMED.                        F0714A    52
*                                                                        F0714A    53
      TOPLAT=.FALSE.                                                     F0714A    54
      DO 1200 ISTP=NSTEP0,NSTEP                                          L0411030   9
*                                                                        F0714A    56
      IF (PC(28).EQ.0) GO TO 1120                                        F0714A    57
      IF (MOD(ISTP,PC(28)).NE.0 .OR. ISTP.LT.IB(28)) GO TO 1120          F0714B     4
      CALL SLICE(D3,IF,JF,KF,D1,D2,IT,'  (U) VELOCITY   ',NPLOT          F0714A    59
     . , DELT,1,ISTP,1,1,PAPERP,TOPLAT)                                  F0714A    60
      CALL VPRFL(D3,IF,JF,KF,'  (U) VELOCITY   '                         F0714A    61
     . , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                                F0714A    62
 1120 CONTINUE                                                           F0714A    63
*                                                                        F0714A    64
      IF (PC(29).EQ.0) GO TO 1130                                        F0714A    65
      IF (MOD(ISTP,PC(29)).NE.0 .OR. ISTP.LT.IB(29)) GO TO 1130          F0714B     6
      CALL SLICE(D3,IF,JF,KF,D1,D2,IS,' (V) VELOCITY   ',NPLOT           F0714A    67
     . , DELT,1,ISTP,2,1,PAPERP,TOPLAT)                                  F0714A    68
      CALL VPRFL(D3,IF,JF,KF,' (V) VELOCITY   '                          F0714A    69
     . , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                                F0714A    70
 1130 CONTINUE                                                           F0714A    71
*                                                                        F0027A     3
      IF (PC(33).EQ.0) GO TO 1140                                        F0027A     4
      IF (MOD(ISTP,PC(33)).NE.0 .OR. ISTP.LT.IB(33)) GO TO 1140          F0027A     5
      CALL HSLAB(D3,IF,JF,DS,IS,JS,D1,D2                                 F0027B     3
     . , '          FLUX   ',ISTP,NPLOT,PAPERP,IRUN)                     F010601E  26
 1140 CONTINUE                                                           L0727830   3
*                                                                        L072783C   3
      IF (PC(30).EQ.0) GO TO 1150                                        L072783C   4
      IF (MOD(ISTP,PC(30)).NE.0 .OR. ISTP.LT.IB(30)) GO TO 1150          L072783C   5
      CALL SLICE(D3,IF,JF,KF,D1,D2,IT,'(U) GEOSTROPHIC ',NPLOT           L072783C   6
     . , DELT,1,ISTP,1,1,PAPERP,TOPLAT)                                  L072783C   7
      CALL VPRFL(D3,IF,JF,KF,'(U) GEOSTROPHIC '                          L072783C   8
     . , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                                L072783C   9
 1150 CONTINUE                                                           L072783C  10
*                                                                        L072783C  11
      IF (PC(39).EQ.0) GO TO 1160                                        L072783C  12
      IF (MOD(ISTP,PC(39)).NE.0 .OR. ISTP.LT.IB(39)) GO TO 1160          L072783C  13
      CALL SLICE(D3,IF,JF,KF,D1,D2,IS,'(V) GEOSTROPHIC ',NPLOT           L072783C  14
     . , DELT,1,ISTP,2,1,PAPERP,TOPLAT)                                  L072783C  15
      CALL VPRFL(D3,IF,JF,KF,'(V) GEOSTROPHIC '                          L072783C  16
     . , NPLOT,DELT,ISTP,DS,IS,JS,PAPERP)                                L072783C  17
 1160 CONTINUE                                                           L072783C  18
*                                                                        L072783C  19
```

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SMS VERSION 5.27    LISTING OF DECK    O C P L O T                                    01/12/84          PAGE 5

          *                                                                             F0714A      73
       1200 CONTINUE                                                                    F0714A      74
            IF (.NOT.PAPERP) CALL DONEPL                                                F0714A      75
            STOP                                                                        F0714A      76
            END                                                                         OCPLOT      12

             225 ACTIVE LINE(S)             119 INACTIVE LINE(S)

OE SETUP
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*** SRS109 : DECK SETVP     IS EDITED FROM SPL       FILE
CREATED ON 10/12/79 AT 17:22:43          LAST UPDATED ON 04/18/83 AT 11:31:43 BY SRS VERSION 5.27
LANGUAGE:                USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F2088     F208C     F209A     F0516A     F11130     F010681E  L0410830

          SUBROUTINE SETVP(L,IFP1,P,JFP1,Z,ISZ,JSZ,KF,DELT,IRUND)           F010681E     3
          IMPLICIT REAL*4 (L)                                               SETVP        2
     $CALL CONVPR                                                           SETVP        3
          DIMENSION L(IFP1),P(JFP1),Z(ISZ,JSZ)                              SETVP        4
          LOGICAL NOLOGO,NOCNK,NINPUT                                       SETVP        5
          NAMELIST/PLTDT3/SPOTL,SPOTP,NOLOGO,NOCNK,GRCE,HMAX                SETVP        6
         . . XTIT,YTIT,SIZE,NSPOT                                           SETVP        7
         . . NOGRID                                                         F11130       3
          IRUN=IRUND                                                        F010681E     5
          DO 50 N=1,10                                                      SETVP        8
          SPOTL(N)=0.                                                       SETVP        9
       50 SPOTP(N)=0.                                                       SETVP       10
          NSPOT=0                                                           SETVP       11
          NOLOGO=.TRUE.                                                     SETVP       12
          NOCNK=.TRUE.                                                      SETVP       13
          GRCE=0.                                                           SETVP       14
          HMAX=0.                                                           SETVP       15
          XTIT=5.                                                           L0410830     3
          YTIT=0.                                                           L0410830     4
          SIZE=1.25                                                         SETVP       18
          NOGRID=.FALSE.                                                    F11130       5
          READ(5,PLTDT3)                                                    SETVP       19
          IF (NSPOT.EQ.0) RETURN                                            F0516A       3
          NINPUT=.FALSE.                                                    SETVP       20
          IF (HMAX.NE.0.) NINPUT=.TRUE.                                     SETVP       21
          CONST=57.29578                                                    F2088        3
          CONSTI=1. / CONST                                                 F2088        4
          DO 60 N=1,NSPOT                                                   F2088        5
          SPOTL(N)=SPOTL(N) * CONSTI                                        F2088        6
       60 SPOTP(N)=SPOTP(N) * CONSTI                                        F2088        7
     *                                                                      SETVP       22
     *    FIND WHERE THE SPOT(S) LIE ON THE MESH                            SETVP       23
     *                                                                      SETVP       24
          DELTI=1. /  DELT                                                  SETVP       25
          IF=IFP1 - 1                                                       SETVP       26
          JF=JFP1 - 1                                                       SETVP       27
          KFM1=KF - 1                                                       SETVP       28
          DO 150 N=1,NSPOT                                                  SETVP       29
          DO 110 I=1,IF                                                     SETVP       30
          IF (SPOTL(N).GE.L(I) .AND. SPOTL(N).LE.L(I+1)) GO TO 115          SETVP       31
      110 CONTINUE                                                          SETVP       32
          CALL STOPP("SPOTL DOES NOT LIE ON MESH IN SETVP$")                SETVP       33
      115 IS(N)=I                                                           SETVP       34
          PARTI(N)=(SPOTL(N)-L(I)) / (L(I+1)-L(I))                          SETVP       35
          DO 120 J=1,JF                                                     SETVP       36
          IF (SPOTP(N).GE.P(J) .AND. SPOTP(N).LE.P(J+1)) GO TO 125          SETVP       37
      120 CONTINUE                                                          SETVP       38
          CALL STOPP("SPOTP DOES NOT LIE ON MESH IN SETVP$")                SETVP       39
      125 JS(N)=J                                                           SETVP       40
          PARTJ(N)=(SPOTP(N)-P(J)) / (P(J+1)-P(J))                          SETVP       41
```

SMS VERSION 5.27   LISTING OF DECK   S E T V P   01/12/84   PAGE 2

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  150 CONTINUE                                          SETVP   42
      DO 200 K=1,KFM1                                   SETVP   43
      XK=K + .5                                         SETVP   44
  200 SIG(K)=(XK - 2.) / (KF - 2.)                      SETVP   45
*                                                       SETVP   46
      IF (MINPUT) GO TO 230                             SETVP   47
      HMAX=AMAX1(Z(I,J),Z(I+1,J))                       F2BBC    3
      HMAX=AMAX1(HMAX,Z(I,J+1))                         F2BBC    4
      HMAX=AMAX1(HMAX,Z(I+1,J+1))                       F2BBC    5
      HMAX=-HMAX                                        F2BBC    6
  230 CONTINUE                                          SETVP   51
      HOD=-HMAX * DELTI                                 SETVP   52
      DO 250 KK=1,20                                    SETVP   53
      SIGMA=FLOAT(KK-1) / 19.                           SETVP   54
  250 THESH(KK)=-(((1.+HOD)**SIGMA)-1.) * DELT          SETVP   55
*                                                       SETVP   56
*                                                       SETVP   57
      RETURN                                            SETVP   58
      END                                               SETVP   59
```

69 ACTIVE LINE(S)   0 INACTIVE LINE(S)

IE VPRFL

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*** SAS109 : DECK VPRFL    IS EDITED FROM SPL       FILE
CREATED ON 10/12/79 AT 17:22:50           LAST UPDATED ON 04/18/83 AT 09:32:26 BY SAS VERSION 5.27
LANGUAGE:             USER INFORMATION:

MODSETS PREVIOUSLY APPLIED TO SPL: F200A    F200D    F200E    F200F    F0521C    F1113A    F1113B    F1229C    F010601E
     F010801E  L041803C

         SUBROUTINE VPRFL(T,IFP1,JFP1,KF,LABEL                              F0521C      3
        . , NPLOT,DELT,IC,Z,ISZ,JSZ,PAPERP)                                 F0521C      4
         IMPLICIT REAL*4 (L)                                                VPRFL       2
*CALL CONVPR                                                                VPRFL       3
         DIMENSION T(IFP1,JFP1,KF),T1(KSIZE),T2(KSIZE),Z1(KSIZE),Z2(KSIZE)  F1229C      3
        . , T4(20,4),TW(KSIZE),LABEL(4),LTIT(20),Z(ISZ,JSZ)                 F010601E    3
        . , NTIT(20),IRLAB(10)                                              F010801E    3
         LOGICAL NOCHK,NOLOGO,PAPERP                                        F0521C      8
  *                                                                         F1229C      6
         IF (KF.GT.KSIZE)                                                   F1229C      7
        .CALL STOPP("ARRAYS TOO SMALL IN VPRFL*")                           F1229C      8
  *                                                                         F1229C      9
         KFM1=KF - 1                                                        VPRFL       7
         DELTI=1. / DELT                                                    VPRFL       8
         CONST=57.29578                                                     F200D       3
  *                                                                         VPRFL       9
         IF (NSPOT.EQ.0) RETURN                                             VPRFL      10
         DO 500 NS=1,NSPOT                                                  VPRFL      11
         DO 160 N=1,4                                                       VPRFL      12
         I=IS(NS) + N - 1 - (N/3) * 2                                       VPRFL      13
         J=JS(NS) + (N/3)                                                   VPRFL      14
         DO 110 KK=1,KFM1                                                   VPRFL      15
     110 TW(KK)=T(I,J,KK)                                                   VPRFL      16
         CALL CUSPLN(SIG,TW,KFM1,T1,T2,Z1,Z2,1,1.,0)                        VPRFL      17
         LOGZBI=1. / ALOG(1. + Z(I,J) * DELTI)                              VPRFL      18
  *                                                                         F200D       3
  *      TRESH IS NEGATIVE                                                  F200D       4
         DO 120 KK=1,20                                                     VPRFL      19
         TSIG=ALOG(1. - TRESH(KK) * DELTI) * LOGZBI                         F200D       6
     120 T4(KK,N)=SPLINE(TSIG,SIG,TW,T2,KFM1)                               VPRFL      21
     160 CONTINUE                                                           VPRFL      22
  *                                                                         VPRFL      23
         DO 200 KK=1,20                                                     VPRFL      24
         TW(KK)=T4(KK,1)*(1.-PARTI(NS))*(1.-PARTJ(NS))                      VPRFL      25
        .        +T4(KK,2)*(    PARTI(NS))*(1.-PARTJ(NS))                   VPRFL      26
        .        +T4(KK,3)*(1.-PARTI(NS))*(    PARTJ(NS))                   VPRFL      27
        .        +T4(KK,4)*(    PARTI(NS))*(    PARTJ(NS))                  VPRFL      28
     200 CONTINUE                                                           VPRFL      29
  *                                                                         VPRFL      30
         IF (PAPERP) GO TO 240                                              F0521C     10
         NPLOT=NPLOT + 1                                                    VPRFL      31
         CALL BGNPL(NPLOT)                                                  VPRFL      32
         CALL BASALF("L/CSTAN")                                             VPRFL      33
         CALL MIXALF("STAND")                                               VPRFL      34
         CALL BLOWUP(SIZE)                                                  VPRFL      35
         IF (NOCHK) CALL NOCHEK                                             VPRFL      36
         CALL GRACE(GRCE)                                                   VPRFL      37
         ENCODE(52,950,LTIT) LABEL                                          VPRFL      38
     950 FORMAT (4A4,"$")                                                   VPRFL      39
```

```
          CALL TITLE(IN ,1,LTIT,100,"(D)EPTH$",100,XTIT,YTIT)              L041003C     3
          ENCODE(52,951,LTIT) LABEL,IC                                     VPRFL       42
      951 FORMAT (4A4,"AT (T)IME (S)TEP ",I3,"$")                          VPRFL       43
          CALL HEADIN(LTIT,-100,4,2)                                       F200F        5
          LOUT=SPOTL(NS) + CONST                                           F200B        5
          POUT=SPOTP(NS) + CONST                                           F200B        6
          ENCODE(52,952,LTIT) LOUT,POUT                                    F200B        7
      952 FORMAT (A(C)AT LOCATION ",F6.1,"(E) : ",F6.1,"(N))$")            VPRFL       46
          CALL HEADIN(LTIT,100,2,2)                                        VPRFL       47
      240 CONTINUE                                                         F0521C      12
          TMAX=-50.                                                        VPRFL       48
          TMIN=100.                                                        VPRFL       49
          DO 250 KK=1,20                                                   VPRFL       50
          IF (TMAX.LT.TW(KK)) TMAX=TW(KK)                                  VPRFL       51
      250 IF (TMIN.GT.TW(KK)) TMIN=TW(KK)                                  VPRFL       52
          IF (PAPERP) GO TO 400                                            F0521C      14
          CALL GRAF(TMIN,"SCALE",TMAX,HMAX,"SCALE",0.)                     L041003C     5
          CALL CURVE(TW,YMESH,20,0)                                        L041003C     6
          ENCODE(40,953,IRLAB) IRUN                                        F010001E     8
      953 FORMAT ("(C)(R)UN #",I4,"()$")                                   F010001E     9
          CALL MESSAG(IRLAB,100,.25,-.8)                                   F010001E    10
          IF (.NOT.NOLOGO) CALL LOGO                                       VPRFL       55
          CALL ENDPL(NPLOT)                                                VPRFL       56
          GO TO 500                                                        F0521C      16
*                                                                          F0521C      17
*         PAPER PLOT                                                       F0521C      18
*                                                                          F0521C      19
      400 CONTINUE                                                         F0521C      20
          ENCODE(80,970,HTIT)LABEL,IC,IRUN                                 F010601E     8
      970 FORMAT ("** ",4A4," AT TIME STEP ",I4,"   (RUN #",I3,")$")       F010601E     9
          CALL BSCALE(TMIN,TMAX,HMAX,0.)                                   L041003C     8
          IF (NOGRID) CALL XGRID                                           F11130       3
          CALL BPLOT(TW,YMESH,20,HTIT)                                     L041003C    10
          LOUT=SPOTL(NS) + CONST                                           F0521C      25
          POUT=SPOTP(NS) + CONST                                           F0521C      26
          PRINT 971,LOUT,POUT                                              F0521C      27
      971 FORMAT (/,"0 AT LOCATION ",F6.1,"(E) : ",F6.1,"(N)")             F0521C      28
      500 CONTINUE                                                         VPRFL       57
          RETURN                                                           VPRFL       58
          END                                                              VPRFL       59
```

89 ACTIVE LINE(S)   23 INACTIVE LINE(S)

Appendix D

Main Program for UVPLOT

```
*** SMS109 : DECK MAIN      IS EDITED FROM SPL       FILE
CREATED ON 01/12/84 AT 11:31:06        LAST UPDATED ON 01/12/84 AT 11:33:14 BY SMS VERSION 5.27
LANGUAGE:              USER INFORMATION:

         PARAMETER IS=40,JS=30,KS=10
        * , IS2=IS * 2
         DIMENSION D1(IS),D2(JS),D3(IS,JS,KS),DS(IS,JS),FLUX(32,24)
        * ,U ZOUT(IS,JS),LABEL1(4),LABEL2(4)
        *         ,LABEL3(4),LABEL4(4)
         REAL*4 LMIN,LMAX
         INTEGER PC(60),ID(60)
         CALL RASTOP
         ENCODE(16,210,LABEL1)
         ENCODE(16,220,LABEL2)
         ENCODE(16,230,LABEL3)
         ENCODE(16,240,LABEL4)
   210   FORMAT("   U VELOCITY    ")
   220   FORMAT("   V VELOCITY    ")
   230   FORMAT("  WG VELOCITY    ")
   240   FORMAT("  WG VELOCITY    ")
         READ (3) KF,DELT,PC,ID,NSTEP,XLSPCT,XPSPCT
         IRUN=KF / 1000
         KF=MOD(KF,1000)
         NSTEPO=NSTEP/10000
         NSTEP=MOD(NSTEP,10000)
         NSTEPO=NSTEPO+1
         READ (2,910) LMIN,LMAX,PMIN,PMAX,IF,JF,XLSPAC,XPSPAC
     910 FORMAT (4F7.1,2I7,1P2E10.3)
         WRITE(10) NSTEP,IRUN,LMIN,LMAX,PMIN,PMAX,IF,JF
         IF (XLSPCT.NE.XLSPAC .OR. XPSPCT.NE.XPSPAC) CALL STOPP
        *(" MESH SPACING INCONSISTENT BETWEEN SIGMA RUN AND ZDATA !")
   C
   C
         IFP1=IF + 1
         JFP1=JF + 1
         IF (IFP1.GT.IS .OR. JFP1.GT.JS .OR. KF.GT.KS)
        *CALL STOPP("ARRAYS ARE TOO SMALL IN OCPLOTS")
   C
         DO 50 I=1,IF
      50 READ(2,920) (ZOUT(I,J),J=1,JF)
     920 FORMAT (10F7.1)
         DO 60 I=1,IF
         DO 60 J=1,JF
    60   DS(I,J)=ZOUT(I,J)
   C
   C     SET UP THE MESH
   C       (NOTE:  THIS IS THE MESH LOCATED AT THE TS POINTS, AND IS
   C                NOT THE MESH FROM THE CODE.)
   C
         CONST=1. / 57.29578
         PRINT 950
         CALL MESHST(D1,IF,LMIN,LMAX,XLSPAC,0)
         PRINT 951
         CALL MESHST(D2,JF,PMIN,PMAX,XPSPAC,0)
         DO 93 I=1,IF
      93 U1(I)=D1(I) * CONST
```

```
      DO 96 J=1,JF
   96 D2(J)=D2(J) * CONST
C
  950 FORMAT (20X,'LONGITUDE MESH:')
  951 FORMAT (20X,' LATITUDE MESH:')
      ISTP=0
      CALL MLEVEL(D3,IF,JF,KF,IF,JF,ZBOT,DS,IS,JS,D1,IF,D2,
     1        JF,LABEL1,ISTP,DELT,IRUN)
C
      DO 200 ISTP=NSTEP0,NSTEP
C
C
      IF (PC(28).EQ.0) GO TO 120
      IF (MOD(ISTP,PC(28)).NE.0 .OR. ISTP.LT.IB(28)) GO TO 120
      CALL MLEVEL(D3,IF,JF,KF,IF,JF,ZBOT,DS,IS,JS,D1,IF,D2,
     1        JF,LABEL1,ISTP,DELT,IRUN)
  120 CONTINUE
C
      IF (PC(29).EQ.0) GO TO 130
      IF (MOD(ISTP,PC(29)).NE.0 .OR. ISTP.LT.IB(29)) GO TO 130
      CALL MLEVEL(D3,IF,JF,KF,IF,JF,ZBOT,DS,IS,JS,D1,IF,D2,
     1       JF,LABEL2,ISTP,DELT,IRUN)
  130 CONTINUE
      IF(PC(33).EQ.0) GO TO 140
      IF(MOD(ISTP,PC(33)).NE.0 .OR. ISTP.LT.IB(33)) GO TO 140
      READ(3) FLUX
 140  CONTINUE
      IF(PC(30).EQ.0) GO TO 150
      IF(MOD(ISTP,PC(30)).NE.0 .OR. ISTP.LT.IB(30))  GO TO 150
      CALL MLEVEL(D3,IF,JF,KF,IF,JF,ZBOT,DS,IS,JS,D1,IF,D2,JF,
     *          LABEL3,ISTP,DELT,IRUN)
 150  CONTINUE
      IF(PC(39).EQ.0) GO TO 160
      IF(MOD(ISTP,PC(39)).NE.0 .OR. ISTP.LT.IB(39)) GO TO 160
      CALL MLEVEL(D3,IF,JF,KF,IF,JF,ZBOT,DS,IS,JS,D1,IF,D2,JF,
     *          LABEL4,ISTP,DELT,IRUN)
 160  CONTINUE
C
C
  200 CONTINUE
      STOP
      END
```

94 ACTIVE LINE(S)   0 INACTIVE LINE(S)

*** SMS167 : PDS DIRECTORY FOR NEWSPL   FILE SUCCESSFULLY UPDATED FOR DECK MAIN

Appendix E

Listings Required for Mediterranean Tests

CREATED ON 02/15/84 AT 11:19:03   LAST UPDATED ON 02/15/84 AT 11:19:03 BY SMS VERSION 5.27
LANGUAGE: USER INFORMATION:

```
/ FXL LIBRARY=6/OBJLIB
      PROGRAM BOTTOM
*
*
*                  ********* SOLUTION DOMAIN **********
*                  ***********************************
*                  ***********************************
*                  ***********************************
*
*        :        :        :        :        :        :        :
*       T(1)     T(2)                                 T(I)     T(IFP1)
*
*             :        :        :        :        :        :
*            Z(1)     Z(2)                                 Z(IF)
*
*
*     THE ACTUAL SOLUTION DOMAIN HAS IF-2 INTERVALS AND RUNS FROM
*       T(2) TO T(IF).  (T(1) AND T(IFP1) ARE EXTRA POINTS.)
*
*     Z IS STAGGERED WRT T AND IS DEFINED FROM A HALF MESH CELL
*       TO THE LEFT OF THE DOMAIN TO A HALF MESH CELL ON THE RIGHT.
*
*     WE PASS TO ROUTINE INTRP ACTUAL LOCATIONS IN DEGREES, WHERE
*       WE NEED THE DEPTH (Z).  THAT IS AN AREA WHICH IS LARGER
*       THAN THE DOMAIN BY A HALF MESH CELL ON ALL SIDES.  SINCE
*       THE DATA BASE POINTS ARE LOCATED ON THE HALF DEGREE.  IT
*       IS BETTER TO PASS VALUES LOCATED AT N + 1/2.
*
*     SUBROUTINE MESHST IS IN THE MAIN SIGMA CODE
*
      PARAMETER PIF=83,PJF=20
      DIMENSION Z(PIF,PJF),DREC(301,91),LAM(PIF),PHI(PJF)
      REAL *4 LAM,LMAX,LMIN,LDIF
      NAMELIST/DOMAIN/LMAX,LMIN,PMAX,PMIN,IF,JF,XLSPAC,XPSPAC
*
      CALL R8STOP
      XLSPAC=0.
      XPSPAC=0.
      READ (5,DOMAIN)
      IF (IF.GT.PIF  .OR.  JF.GT.PJF)   STOP 888
      PRINT 902,LMIN,LMAX,PMIN,PMAX,IF,JF
  902 FORMAT (1H1,' THE DOMAIN RUNS FROM ',F6.1
     . , ' DEGREES EAST TO ',F6.1,' DEGREES EAST, AND '
     . ,F6.1,' DEGREES NORTH TO ',F6.1,' DEGREES NORTH.',/
     . , 1H0,' THE MESH IS (IF=) ',I3,' BY (JF=) ',I3,'.')
      IF (XLSPAC.NE.0.) PRINT 905,XLSPAC
      IF (XPSPAC.NE.0.) PRINT 906,XPSPAC
  905 FORMAT (//,' THE CENTRAL LONGITUDE SPACING IS ',1PE10.3
     . , ' DEGREES')
  906 FORMAT (//,' THE CENTRAL LATITU DE SPACING IS ',1PE10.3
     . , ' DEGREES')
      REWIND 1
      REWIND 2
      READ (1) DREC
```

```
      CALL MESHGT(LAM,IF,LMIN,LMAX,XLSPAC,0)
      CALL MESHGT(PHI,JF,PMIN,PMAX,XPSPAC,0)
      IFM1=IF - 1
      JFM1=JF - 1
      DO 200 I=2,IFM1
      DO 200 J=2,JFM1
  200 CALL INTRP(Z(I,J),LAM(I),PHI(J),DREC)
*
  100 CONTINUE
*
*     FIX UP BOUNDARIES
*
      DO 210 J=2,JFM1
      Z(2   ,J)=1.
  210 Z(IFM1,J)=1.
*
      DO 220 I=2,IFM1
  220 Z(I,2)=1.
C
      DO 230 I=15,IFM1
  230 Z(I,JFM1)=1.
*
*     DO BOUNDARIES
*
      DO 300 J=2,JFM1
      Z(1,J)=Z(2,J)
  300 Z(IF,J)=Z(IFM1,J)
      DO 350 I=1,IF
      Z(I,1)=Z(I,2)
  350 Z(I,JF)=Z(I,JFM1)
*
*     MAKE LAND INTO SHALLOW WATER
*
      DO 400 J=1,JF
      DO 400 I=1,IF
  400 IF (Z(I,J).LE.1.) Z(I,J)=1.
*
*     PUT IT UP
*
C     DO 510 II=1,2
C     LU=4*II - 2
        LU=2
      WRITE(LU,904)LMIN,LMAX,PMIN,PMAX,IF,JF,XLSPAC,XPSPAC
  904 FORMAT (4F7.1,2I7,1P2E10.3)
      DO 500 I=1,IF
  500 WRITE(LU,903)(Z(I,J),J=1,JF)
  903 FORMAT (10F7.1)
  510 CONTINUE
*
      CALL PRT(0,'DEPTHS0',Z,PIF,PJF,1,1,.TRUE.,0)
*
      STOP
      END
      SUBROUTINE INTRP (Z,LAM,PHI,D)
*
*     THE DATA IS LOCATED AT 10' INTERVALS.  THE LOWER LEFT
*       CORNER IS AT -10 DEG E. AND +30 DEG N.
*
```

```
*      IL AND JL ARE THE INDICES OF THE NEXT LOWER DATA BASE POINT.  SI
*        AND SJ ARE THE FRACTIONS THAT THE ACTUAL POINT IS ABOVE IL AND
*        JL.  THAT IS IF SI=.5, THEN THE ACTUAL POINT IS HALF WAY BETWEEN
*        IL AND IL+1.
*
       DIMENSION D(301,91)
       REAL*4 LAM,LCOR
       DATA LCOR/-10./,PCOR/30./
*
       XL=(LAM-LCOR) * 6.
       IL=IFIX(XL)
       IU=IL + 1
       IF (IL.LT.1 .OR. IU.GT.301) CALL STOPP
      .(' YOUR REGION DOES NOT LIE COMPLETELY ON DATA SET $')
       SI=XL - FLOAT(IL)
*
       XP=(PHI-PCOR) * 6.
       JL=IFIX(XP)
       JU=JL + 1
       IF (JL.LT.1 .OR. JU.GT.91) CALL STOPP
      .(' YOUR REGION DOES NOT LIE COMPLETELY ON DATA SET $')
       SJ=XP - FLOAT(JL)
*
       SIR=1. - SI
       SJR=1. - SJ
       Z=    D(IL,JL) * SIR * SJR
       Z=Z + D(IL,JU) * SI  * SJR
       Z=Z + D(IU,JL) * SIR * SJ
       Z=Z + D(IU,JU) * SI  * SJ
*
*
       RETURN
       END
 / IF E.NE.0,SKIP
 / RGET FT01F001,S/MTOPO
 / REL FT02F001,FT06F001,SEE
 / FD FT02F001,LREC=126,BKSZ=2520,FORG=PS,RCFM=FBS
 / OXT
  &DOMAIN
       LMIN=10.,  LMAX=37.,
       PMIN=32.,  PMAX=38.,
       IF=83,     JF=20,
       XLSPAC=0., XPSPAC=0.,
  &END
 / PUT FT02F001,S/ZDATA
 / PUT SEE,S/T1
 /SKIP NOP
```

159 ACTIVE LINE(S)   0 INACTIVE LINE(S)

*** SMB167 : PDS DIRECTORY FOR NEWSPL   FILE SUCCESSFULLY UPDATED FOR DECK TOPOG

$DK LOCATION,ACTION=ADD

CREATED ON 02/15/84 AT 11:19:04 LAST UPDATED ON 02/15/84 AT 11:19:04 BY SMS VERSION 5.27
LANGUAGE: USER INFORMATION:

```
/ LIMIT MIN=2
/ FXL LIBRARY=PT/OBJLIB
      DIMENSION XLAT(63,63),XLONG(63,63),D(63,63)
      CALL R*STOP
      RD=180. / (4.*ATAN(1.))
*
      CALL GRIDC(1,63,1,63,XLONG,XLAT,D)
      XLONG=XLONG * RD
      XLAT =XLAT  * RD
*
      D=0.
      DO 10 J=1,63
      DO 10 I=1,63
      IF (( XLAT(I,J).GE.32.  .AND.  XLAT(I,J).LE.38. ) .AND.
     .   (XLONG(I,J).GE.10. .AND. XLONG(I,J).LE.37.)) D(I,J)=1.
   10 CONTINUE
*
      IS=0
   15 IS=IS + 1
      DO 20 J=1,63
      IF (D(IS,J).EQ.1.) GO TO 25
   20 CONTINUE
      GO TO 15
   25 CONTINUE
*
      IE=64
   30 IE=IE - 1
      DO 35 J=1,63
      IF (D(IE,J).EQ.1.) GO TO 45
   35 CONTINUE
      GO TO 30
   45 CONTINUE
*
      JS=0
   50 JS=JS + 1
      DO 55 I=IS,IE
      IF (D(I,JS).EQ.1.) GO TO 60
   55 CONTINUE
      GO TO 50
   60 CONTINUE
*
      JE=64
   65 JE=JE - 1
      DO 70 I=IS,IE
      IF (D(I,JE).EQ.1.) GO TO 75
   70 CONTINUE
      GO TO 65
   75 CONTINUE
*
      JM=JS + JE
      DO 200 I=IS,IE
*
      DO 90 J=JS,JE
      JB=J
```

```
      IF (D(I,J).EQ.1.) GO TO 95
   90 CONTINUE
$
   95 CONTINUE
      DO 100 J=JS,JE
      JL=JM - J
      IF (D(I,JL).EQ.1.) GO TO 105
  100 CONTINUE
$
  105 CONTINUE
      PRINT 902,I,JB,JL
  902 FORMAT (' AT I= ',I2,' J RUNS FROM ',I2,' TO ',I2)
  200 CONTINUE
$
$     LEAVE AN EXTRA ONE ALL THE WAY AROUND FOR THE INTERPOLATION
$
      IS=IS - 1
      IE=IE + 1
      JS=JS - 1
      JE=JE + 1
$
      PRINT 901,IS,IE,JS,JE
  901 FORMAT ('    IS=',I2,'      IE=',I2,'     JS=',I2,'     JE=',I2)
      END
/ OXT
/ COM ANSWER:
```

80 ACTIVE LINE(S) 0 INACTIVE LINE(S)

$$$ SMS167 : PDS DIRECTORY FOR NEWSPL FILE SUCCESSFULLY UPDATED FOR DECK LOCATION

$DK INITIAL,ACTION=ADD

```
CREATED ON 02/15/84 AT 11:19:05          LAST UPDATED ON 02/15/84 AT 11:19:05 BY SMB VERSION 5.27
LANGUAGE:            USER INFORMATION:

  / GET OBJLIB,PT/OBJLIB                                          INITIAL   1
  / LNK                                                           INITIAL   2
  LIBRARY OBJLIB                                                  INITIAL   3
  INCLUDE TAPER3                                                  INITIAL   4
  / TAPEREAD SEEOPT=0,TAPEPATH=N/CLIMAT,CATPATH=S/INITLDTA,:      INITIAL   5
         RUNTIME=2000,FILESIZE=20,LOADV=$                         INITIAL   6
   &ONE                                                           INITIAL   7
         IS=45,  IE=50,  JS=31,  JE=40,                           INITIAL   8
         NPW=20,  SIGNAD=T,                                       INITIAL   9
   &END                                                           INITIAL  10
  T  SEAA                                                         INITIAL  11
  T0400 A                                                         INITIAL  12
  T0600 A                                                         INITIAL  13
  T0800 A                                                         INITIAL  14
  T1000 A                                                         INITIAL  15
  T1500 A                                                         INITIAL  16
  T2000 A                                                         INITIAL  17
  T3000 A                                                         INITIAL  18
  T4000 A                                                         INITIAL  19
  T5000 A                                                         INITIAL  20
  S0000 A                                                         INITIAL  21
  S0050 A                                                         INITIAL  22
  S0100 A                                                         INITIAL  23
  S0200 A                                                         INITIAL  24
  S0600 A                                                         INITIAL  25
  S1000 A                                                         INITIAL  26
  S2000 A                                                         INITIAL  27
  S3000 A                                                         INITIAL  28
  S4000 A                                                         INITIAL  29
  S5000 A                                                         INITIAL  30

          30 ACTIVE LINE(S)           0 INACTIVE LINE(S)

*** SMB167 : PDS DIRECTORY FOR NEWSPL   FILE SUCCESSFULLY UPDATED FOR DECK INITIAL

$OK FORCING,ACTION=ADD
```

CREATED ON 02/15/84 AT 11:19:06 LAST UPDATED ON 02/15/84 AT 11:19:06 BY SMS VERSION 5.27
LANGUAGE: USER INFORMATION:

```
  1   / RSET OBJLIB,PT/OBJLIB                              FORCING    1
  2   / LNK                                                FORCING    2
  3   LIBRARY OBJLIB                                       FORCING    3
  4   INCLUDE TAPER                                        FORCING    4
  5   / TAPEREAD TAPEPATH=N/SAIATM2,CATPATH=S/FORCING,:    FORCING    5
  6         RUNTIME=4000,FILESIZE=20,LOADV=$               FORCING    6
  7    &ONE                                                FORCING    7
  8         YEAR=77,  MONTH=1,  DAY=7,  HOUR=0,            FORCING    8
  9         IS=45,  IE=50,  JS=31,  JE=40,                 FORCING    9
 10         NT=56,  DT=6.,                                 FORCING   10
 11         SIGMAD=T,   A27A28=T,                          FORCING   11
 12    &END                                                FORCING   12
```

12 ACTIVE LINE(S) 0 INACTIVE LINE(S)

*** SMS167 : PDS DIRECTORY FOR NEWGPL FILE SUCCESSFULLY UPDATED FOR DECK FORCING

END

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